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Telephony

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine, and The Telephone

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

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1889 Paris Exposition Medal for Rubber Insulation — 1893 World's Fair Medal for Rubber Insulation

OKONITE — TRADE MARK REG. U.S. PAT. OFFICE

THE STANDARD FOR RUBBER INSULATION

OKONITE WIRES, OKONITE TAPE, MANSON TAPE, CANDEE PAT'D POTHEADS

THE OKONITE CO., Ltd. Sole Manufacturers 253 Broadway, New York

WILLARD L. CANDEE, H. DURANT CHEEVER, MANAGERS. W. H. HODGINS, SECRETARY. GEO. S. MANSON, SUPERINTENDENT. W. C. CANDEE, ASST. SECRETARY.

OKONITE — TRADE MARK REG. U.S. PAT. OFFICE

CONDUIT

P C C

CLAY PRODUCT COMPANY

Stock Exchange Bldg. CHICAGO

CHAS. G. STEVENS CO.

BRIGHT COLD ROLLED AND COLD DRAWN

NORWAY IRON, MAGNET STEEL

Cold Drawn Steel Rounds, Flats, Square, Hexagons.

COLD ROLLED STRIP STEEL

LARGE STOCK ALWAYS ON HAND.

58-60 South Canal Street, CHICAGO

McROY CONDUITS

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ROOKERY BUILDING

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Insulated Wires and Cables

1850 DAYS KERITE 1908

The Insulation which has withstood successfully the test of half a century

W. R. BRIXEY, Sole Manufacturer

HUDSON TERMINAL

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CHICAGO TELEPHONES SATISFY

CHICAGO TELEPHONE SUPPLY CO.

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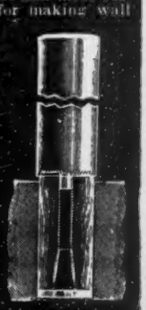
ELKHART, IND. U.S.A.

Metropoliton Expansion Plugs

(Creosoted)

No. 1.

The cheapest and most efficient method for making wall connections. The holding power of this plug is enormous and is suitable for a great variety of work. Cut No. 1 shows a perspective view of the plug with screw inserted. Cut No. 2 shows plug being driven in by means of driving tool. Peg expands plug as latter is driven in. Sizes ¼" and ⅜" diameter.



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Yonkers Specialty Co.

YONKERS, N. Y.

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Telephone Pair a Specialty

DETROIT INSULATED WIRE CO.

Detroit, Mich.

PLATINUM

Wire, Sheet, Rivets and Contacts

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TELEPHONE CABLE

WATERBURY CO., 69 SOUTH STREET, NEW YORK CITY

ALPHABETICAL INDEX TO ADVERTISEMENTS ON PAGE 19

Simple and Scientific

We ship fresh goods to you direct from our factory

Bulletins

No. 15. — The Construction of Dry Cells

No. 16.—The Dry Cell and the Telephone Manager

Sent on Application

FLEUR DE LIS DRY CELL

FOR TELEPHONE SERVICE

French Battery & Carbon Co., Madison, Wis.

The Indiana Rubber & Insulated Wire Co.

MANUFACTURERS OF

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We Make Toll Tickets by the Million

By means of new facilities just acquired, and thus produce them better and cheaper than can be done in small lots. We can furnish them promptly in any quantity, on better paper, put up in better shape, and at LOWER PRICES THAN EVER BEFORE OFFERED.

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All kinds of Blanks, Forms and Books for Telephone and Toll Line Accounting.

Write for Sample Forms and Prices.

THE TELEPHONE PRINTING COMPANY

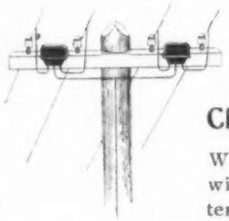
DEFIANCE, OHIO

HOW TO USE THE WILLIAMS TEST CLAMP

Hold clamp between thumb and first finger, then press together, causing the jaws to open wide. Insert the wire you are to test in the valley or groove and release the pressure, allowing the needle points to come down on the insulation with a clean bite. Then with the thumb on the stud or screwcap press the jaws together firmly. This will force the needles through the insulation, making a good contact with the conductor, which contact the spring steel jaws will hold steadily while the test is made. Send 75c. for a set (2) postpaid. Your money back if you want it.

The Williams Test Clamp Co.

720 Electric Bldg. Cleveland, O.



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Relieve the pressure, so do

Chapman Lightning Arresters

Where no relief is furnished you will find splintered poles and interrupted service. Chapman Arresters mean continuous service and reduced cost of maintenance. They are absolutely weatherproof and require no attention after erecting. Think it over.

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Get our prices on

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All orders shipped same day on which they are received

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The Wire of Quality

TELEPHONE WIRE

Best by Every Test

A Difference in Wire makes a Difference in Service.

LONGEST LIFE—HIGHEST EFFICIENCY

Universities have tested our wire and found it of the highest quality. Leading Telephone Companies use it, with perfect satisfaction in most exacting service.

Write for Samples and Prices Today

Handled by Representative Jobbers and Supply Houses

INDIANA STEEL & WIRE COMPANY

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Five Men on a 95 cent PEIRCE SEAT

We make six designs of seats, three all steel and three with wood seats.

Get circulars.

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IN YOUR STORAGE BATTERY ROOM

AMERICAN CIRCULAR LOOM CO. TRADE MARK REGISTERED

Use Circular Loom for protecting and insulating your battery leads. Place Circular Loom around metal pipes running above the cells to protect them from fumes and to keep metal particles from falling off into the battery. It's neater and better than the ordinary boxing.

You'll find new Circular Loom uses for every day.

Order from your dealer or address

AMERICAN CIRCULAR LOOM CO.

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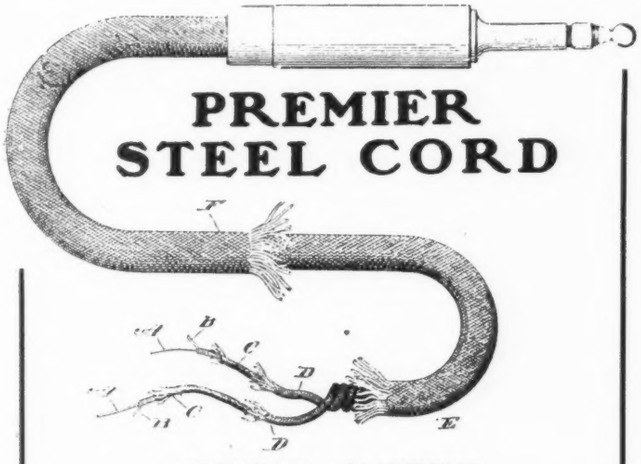
NEW YORK CHICAGO SAN FRANCISCO



PREMIER STEEL CORD

ALWAYS IN ALIGNMENT

In the hollow of the cord at the plug end, there's a reinforcing spring made of the highest grade spring steel. Not only does this prevent the conductors from being thrown out of alignment, but it also makes it practically impossible to break the cord at the plug end, and that's where the strain is greatest. Operators don't have to be careful when you use Premier Steel Cord—it'll last in spite of shamefully careless usage. Better get details.

Runzel-Lenz Electric Mfg. Co.

97-101 South Clinton Street, Chicago

Receiver Shells and Mouth-pieces

One Piece Shells

YOU'VE **got** to replace shells and mouth pieces. You **want** to cut down the **cost** of doing so. You **can** economize by buying from me. I'll save you money on shells and mouth pieces for **all** makes of telephones.

Ask for Prices

F. W. PARDEE

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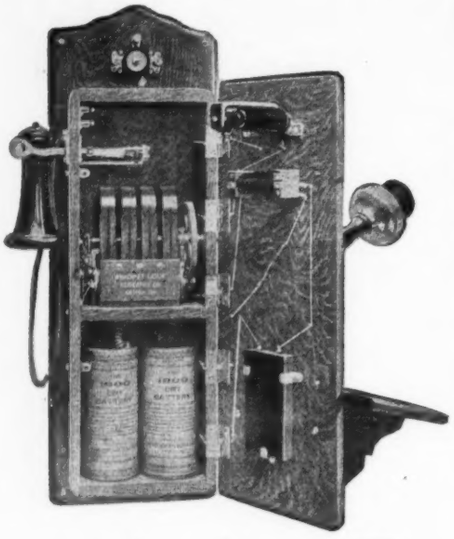


WHEN YOU order a Cracraft, Leich Telephone, you can rest assured that you will not only receive a telephone that is properly designed, but also one that is properly made. None but the best of materials are used in its construction. Our manufacturing department is equipped with the proper tools and gauges, making our product uniform and reliable.

We make every part of this telephone except the cabinet. The cabinet is made per our specifications and is the best we can buy. Telephones shipped with or without batteries as desired. Write to us. We can be of service to you.

Cracraft, Leich Electric Co., Genoa, Ill.

If Not—Why Have You Not

Investigated the one absolutely desirable Four Party Selective System on the market.

Others have tried.
We have succeeded.
Their systems are complex.
Ours is simple.
Theirs are expensive.
Ours costs less.
Theirs require constant attention.
Ours seldom, if ever.

Our working installations prove it all. We want to tell YOU all about it.

STANDARD TELEPHONE MFG. CO.
PORTSMOUTH, OHIO

SUCCESSORS TO
The Williams Telephone & Supply Co., Cleveland, Ohio
The Knox-Dickey Telephone Mfg. Co., Portsmouth, Ohio
The Drake Telephone Mfg. Co,, McConnelsville, Ohio

If You Consider THE POOLE Lock-Out System

as an addition to party-line service, you are wrong. It is not something added—it is a feature which has always belonged to good service. It unfailingly gives absolute

SECRECY

to any of the parties on the line. It gives the subscriber all the advantages of a private line at the cost of a party line. It enables you to put more parties on a line, and get higher rates.
Now, do you want details?

Mountain State Electrical Co.,
Wheeling, W. Va.

DO YOU KNOW WOOD?

¶ Unless you positively know what good wood is, it is not safe to buy any kind of a "wooden telephone" without a guarantee that

FIRST—The quality of the material cannot be improved, and

SECOND—That the telephone cabinet is perfectly adapted for the purpose for which it is used.

¶ Besides being the best obtainable, every inch of wood in "Stromberg-Carlson" cabinets is thoroughly and scientifically kiln dried and severely tested BEFORE being used.

No. 7—Line Binding Posts and Carbon Block Lightning Arrester.

No. 5—Hookswitch—Its point of merit: Simplicity, good mechanical construction, positiveness of action, lever movement, such as will insure maximum pressure on contacts. There are no "floating springs."

Golden Oak Woodwork—Now made in our own factories from carefully selected kiln-dried oak woodwork—machine made and hand finished by expert cabinet makers. Nothing cheap.

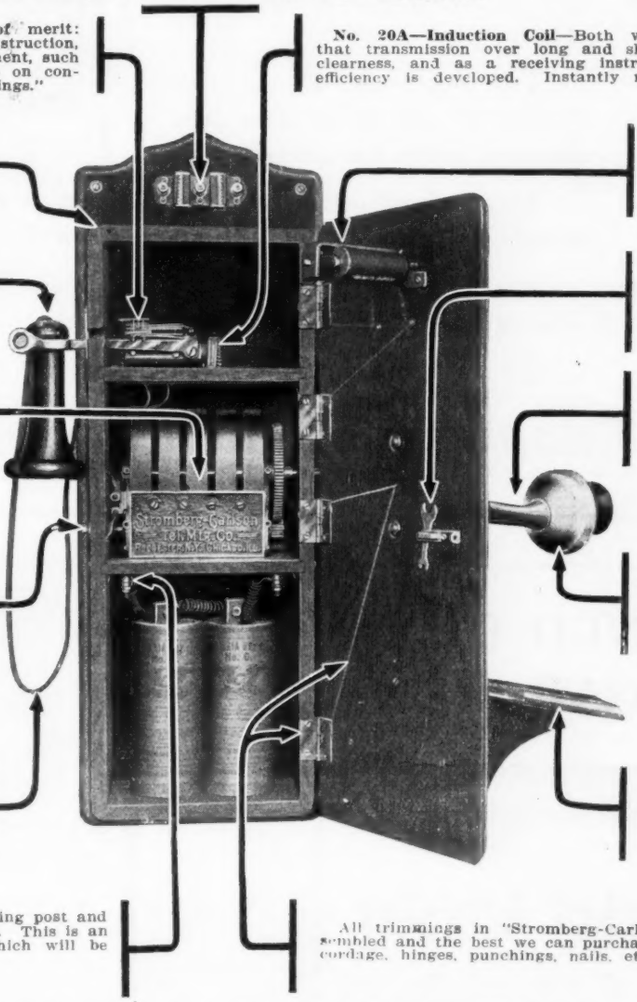
No. 14A—Receiver—The acknowledged standard for any kind of telephone work. Receiving qualities well defined and distinct. Permanent adjustment—no castings—uniform ground pole pieces. Composition shell.

No. 24—Generator—Its high voltage output and greater permeability make it the best generator for all kinds of service. Well designed laminated carefully wound armature. Machine cut gears.

A screw lock that fastens door firmly. Has a spiral tension spring that keeps screw end back from lock bracket when swinging door closed.

No. 7—Receiver Cord—A braided copper tinsel conductor cord insulated with braided cotton and green spun machine silk. The best cord that you can buy. They outwear any other kind.

A combination machine nut binding post and soldered terminal for the batteries. This is an extra feature we provide and which will be found a great convenience.



No. 20A—Induction Coil—Both windings are so proportioned that transmission over long and short lines is a maximum for clearness, and as a receiving instrument the highest degree of efficiency is developed. Instantly removable.

No. 6—Ringer—No design ever approached it for simplicity—durability and efficiency. Armature and clapper rod adjustment independent of ringer mounting. Special spool construction—full copper windings.

This double end wrench is one of the accessories furnished for adjusting any nuts used in the construction of the various parts constituting a complete magneto telephone.

No. 10—Transmitter Arm—Made of cold drawn steel—including the base of one piece. Indestructible and adjustable. Richly enameled and hand finished. Improves the appearance of any telephone.

No. 7B—Transmitter—A leading product that is out of the experimental class—producing everlastingly the maximum volume of voice transmission with excellent articulation. Every atom of carbon used is made in our own factory.

Some ingenuity is exercised in the design of our telephone cabinets. All corners and surfaces are made plain to simplify finishing and insure protection against breakage.

All trimmings in "Stromberg-Carlson" instruments carefully assembled and the best we can purchase. Special terminal wires and cordage, hinges, punchings, nails, etc., are provided.

¶ You will be safe in buying a "Stromberg-Carlson" Magneto Telephone merely on its appearance, but we don't ask you to do this—*we guarantee to deliver to you a Magneto Telephone that will outwear and outlast all others*

May we send it to you—today?

STROMBERG-CARLSON TEL.MFG.CO.

ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL. KANSAS CITY, MO.

A COMPACT TELEPHONE

OF THE

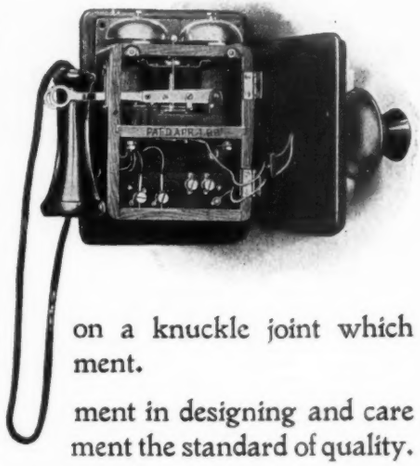
HOTEL AND RESIDENCE TYPE

FOR PRIVATE BRANCH AND CENTRAL ENERGY SYSTEMS

The hook switch is mounted on a removable shelf which can be taken out without cutting a wire or breaking a soldered connection.

The size over all is only 9½"x6⅞", yet the receiver does not hang below the cabinet.

The transmitter is mounted on a knuckle joint which permits of considerable adjustment.



Our common battery equipment shows the same judgment in designing and care in construction which long ago made our magneto equipment the standard of quality.

Let us figure on your requirements.

Monarch Telephone Manufacturing Company

General Office and Factory, Washington and Morgan Streets, Chicago — Branch House, 177 Main Street, Dallas, Tex.

DESIGNED BY PRACTICAL MEN

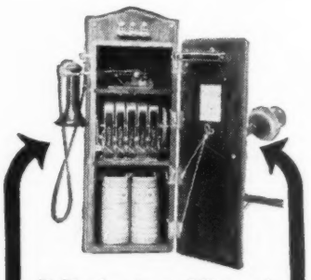
The Sky Rocket Arrester

Made for practical work, and they do it right. Their mission is to protect your lines from charges of excessive potential whether due to lightning or other causes, and they fulfill this mission invariably and infallibly.

Details, prices and references await your inquiry.

CHANCE MANUFACTURING CO.

CENTRALIA, MO., U. S. A.



If You're from Missouri We're from Milwaukee

and can certainly show you a saving in your repair charges by sending you a couple of Andrae Special Heavy Giant bridging telephones to put on your rural lines.

The difference between the "ANDRAE GIANT" and other telephones lies in the grade of material and workmanship used in their construction and to this is due the fact that they will out wear all other instruments, require less attention and cut repair charges to practically nothing.

Give us a chance to show you.

Julius Andrae & Sons Co.
48 Years at MILWAUKEE

U. S.
Patent Office

Allows All Claims for

New
Ericsson Clear Out System

No References quoted or Objections made by the Commissioner.

This is unusual and proves Original Design.

POINTS:

Perfectly clear Talking Circuit
Positive clear out Signal
Prevents all tapping of Party Line Ringers
Practical, simple, ideal
Perchance what you have been looking for

L.M.ERICSSON TEL.MFG.CO.
BUFFALO, N.Y.

Regarding the Automanual System

The manager of a large Western exchange after inspecting the Automanual System said to the writer of this advertisement a few days ago:

"I almost made the mistake of placing my order for other equipment without knowing just what the Automanual System is. It was your persistent advertising of the System rather than what you said that attracted my attention. If you just let telephone people know what you have, they will all want it."

Not a very favorable comment on our advertisements but we could not ask a stronger endorsement of the System.

But you are more interested in what we have than in what we say about it. If **you** don't understand what the System will do for you write us asking for the specific information you need. We will do all we can to make it plain.

Trade Mark
AUTOMANUAL
Reg. U. S. Pat. Off.

The North Electric Company

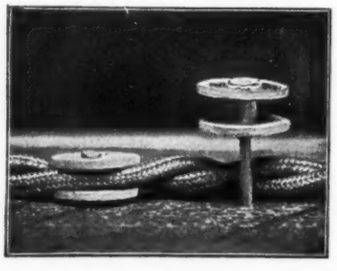
DALLAS CLEVELAND KANSAS CITY

Eureka Fibre Insulators

A NEW STYLE

"PRICES TO POINT, WHERE IT IS ECONOMY TO USE THEM"

The value is in the method that they are attached without injury to the wire

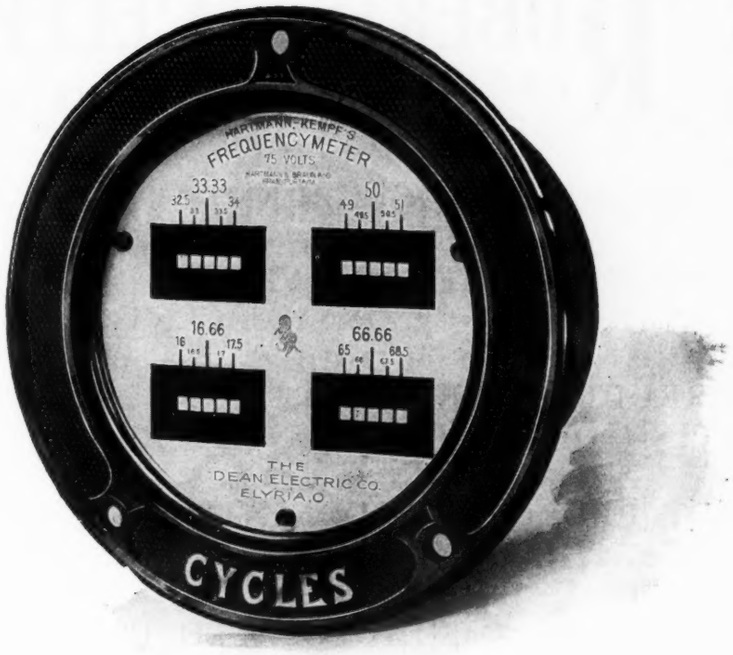


Made in Three Types 50, 60, 70 ¾", ⅞" and 1" long respectively

PRICES AND SAMPLES ON APPLICATION

Commercial Electrical Supply Co.

Fifteenth and Pine Streets ∴ ∴ ST. LOUIS, MO.



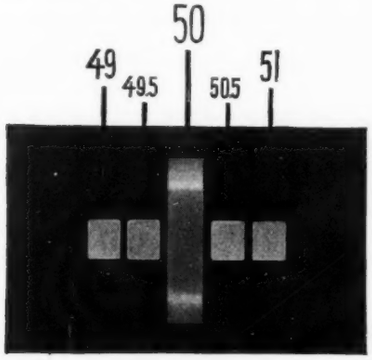
SCIENTIFIC SELECTION

¶ **The "Dean" Harmonic System** is still the only successful party line selective ringing apparatus in the world.

¶ **Absolutely no Failures** is the "Dean" record since the introduction of our Harmonic Converter (registered trade-mark) and our Harmonic telephones.

¶ **No working Installations** can be shown by some of the makers of imitating appliances—hence the long list of "Dean" successes is abundant proof of superiority.

¶ **Even the Slightest** uncertainty is now eliminated —"Dean" selective ringing is an exact science through the use of the



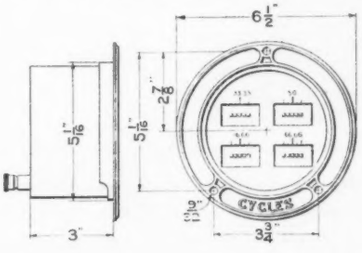
Hartmann-Kempf Frequency Meter.

¶ **With this Instrument** the number of cycles per second may be readily determined—the reading is instantaneous.

¶ **Plain Readings** are indicated by the reeds which vibrate as illustrated. Each of these reeds is a separate unit, even if one should be broken, the efficiency of the others would not be impaired.

¶ **Their Permanency** has been proven by three years' continuous vibration before the invention was marketed.

¶ **Hartmann-Braun, A. G.,** the manufacturers, of Frankfort a /M, Germany, have made us the American sales agents for this special instrument.



¶ **The Exact Dimensions** are shown in this drawing. The meter may be mounted in a portable case, or on a suitable mounting board above your power panel; or, it may be specified for any new "Dean" board.

¶ Send for Dean Folder No. 15.

The Dean Electric Company

ELYRIA, OHIO, U. S. A.

San Francisco **Kansas City**

HOMER ROBERTS TELEPHONES

HARMONIC REMOVE TROUBLES

RINGING

NO DANGEROUS HIGH TENSION CURRENTS TO INJURE THE EAR

HENCE

NO DAMAGE SUITS BY DEAFENED PATRONS
NO INDUCTIVE INTERFERENCE ON ADJACENT LINES

REMOVES

CAUSE OF INTERRUPTED SERVICE ON BUSY LINES
NO EAVESDROPPING OR MALICIOUS INTERFERENCE

TROUBLESOME

PARTIES CAN NOT REDUCE YOUR PLANT'S EFFICIENCY
NO EXPENSIVE SEARCHING FOR LINE TROUBLES ON THIS

SYSTEM

TROUBLE QUICKLY AND EASILY LOCATED FROM CENTRAL
THE ONLY LIMIT TO PARTIES ON A SINGLE CIRCUIT IS THAT OF SERVICE VOLUME

FOR FURTHER INFORMATION ADDRESS

Homer Roberts Telephone Co., 1703 Melrose St., Chicago, Ill.

U. S. COMBINED

CASH REGISTER and PAY STATION

GIVE THE BEST SERVICE

Single Gong only — A Cash Ticket with every collection

NO ERRORS — CASH ACCOUNTED FOR

The United States Coin Register Co.

MONROE, MICH.

MONNOT COPPER-CLAD STEEL WIRE

Weighs less, Costs less. Stronger and better than any other wire

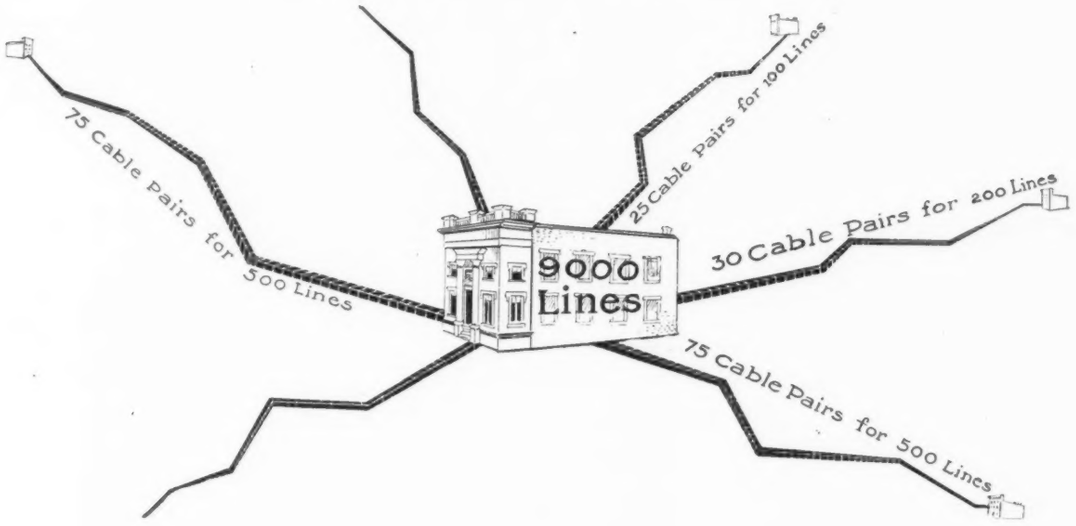
CARRIED IN STOCK AT CHICAGO, ST. LOUIS, FORT WORTH

MANUFACTURED BY

Duplex Metals Co., 208 Fifth Ave., New York

Invest in an Octopus

It's a Good Dividend Payer


75 Cable Pairs for 500 Lines
25 Cable Pairs for 100 Lines
30 Cable Pairs for 200 Lines
9000 Lines
75 Cable Pairs for 500 Lines

WE will sell you a puppy and you can raise it yourself. To be more specific, we will help you to found and grow a Multi-Office Automatic Telephone System in your city that will save you so much cable that you can't keep it from paying dividends. With this system you put your switchboards where your subscribers are and don't go broke buying cable to bring your subscribers to one centrally located switchboard. For example—One company put a 500 line Automatic substation 3 miles from its central office and saved enough in cable and conduit to pay twice over for a lot and a handsome, brick residence and office building, combined, in which the equipment was installed. The cost of all labor employed in this office is $75.00 per month, $1.80 per line per annum. The service is just as good as in a single office system. Ask us to tell you more about it.

Our Automatic System has been adopted in the following cities:

Aberdeen, South Dakota.
Akron, Ohio.
Allentown, Pennsylvania.
Auburn, Maine.
Auburn, New York.
Battle Creek, Michigan.
Beaver Falls, Pennsylvania.
Bellingham, Washington.
Berkeley, California.
Billings, Montana.
Butte, Montana.
Cadillac, Michigan.
Champaign, Illinois.
Chicago, Illinois.
Cleburne, Texas.
Columbus, Georgia.
Columbus, Ohio.
Dayton, Ohio.
Decatur, Illinois.
Dowagiac, Michigan.
Edmonton, Alberta, Canada.
El Paso, Texas.
Emaus, Pennsylvania.
Fall River, Massachusetts.
Grand Rapids, Michigan.
Hastings, Nebraska.
Havana, Cuba.
Hazleton, Pennsylvania.
Holland, Michigan.
Hopkinsville, Kentucky.
Houston, Texas.
Jonesboro, Arkansas.
Kenton, Ohio.
Lake Benton, Minnesota.
Lansing, Michigan.
Lewiston, Maine.
Lincoln, Nebraska.
Los Angeles, California.
Manchester, Iowa.
Marianao, Cuba.
Medford, Wisconsin.
Mount Olive, Illinois.
New Bedford, Massachusetts.
Norfolk, Nebraska.
Oakland, California.
Ocean Park, California.
Omaha, Nebraska.
Pontiac, Illinois.
Portland, Maine.
Portland, Oregon.
Princeton, New Jersey.
Richmond, Indiana.
Riverside, California.
Rochester, Pennsylvania.
Rushville, Indiana.
San Diego, California.
San Francisco, California.
Santa Monica, California.
Saskatoon, Sask., Canada.
Sioux City, Iowa.
South Bend, Indiana.
Spokane, Washington.
St. Marys, Ohio.
Strathcona, Alberta, Canada.
Tacoma, Washington.
Toronton Junction, Canada.
Travers City, Michigan.
Urbana, Illinois.
Van Wert, Ohio.
Washington, Pennsylvania
Wausau, Wisconsin.
Westerly, Rhode Island.
Wilmington, Delaware.

Automatic Electric Company

Van Buren & Morgan Streets

Chicago, U.S.A.

J. D. BROOKER, PRESIDENT J. C. CORKINS, SECRETARY EDWARD PINNEY, TREASURER.

Cass City Telephone Co.

CASS CITY, MICHIGAN, August 5, 1908.

Long Distance Telephone Mfg Co.
South Bend - Indiana

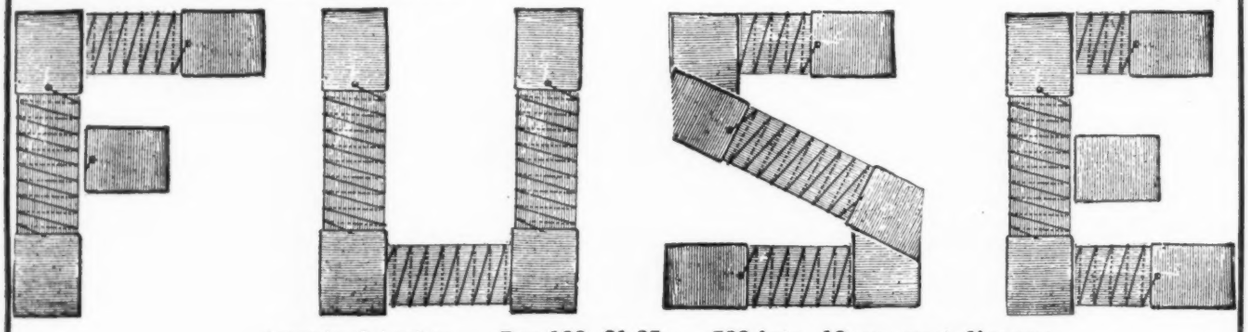
Dear Sirs:- Have yours of the 1st. inst. and in reply I beg to say that our Company are now using over seventy of your Long Distance Phones with Duplex generators and altho we are also using eight different makes of phones the Long Distance gives the best general satisfaction.

Yours truly
J. C. Corkin, Sec.
Cass City Telephone Co.

USE THE BEST
COSTS NO MORE

6 times the fuse length
18 sharp angles for impedence
Special wire accurately rated, not easily broken. Tinned copper terminals, can be used on any standard W. U. block

No. 1 Patent Wrapped



Length, 2 inches. Per 100, $1.25. 500 lots, 10 per cent discoun

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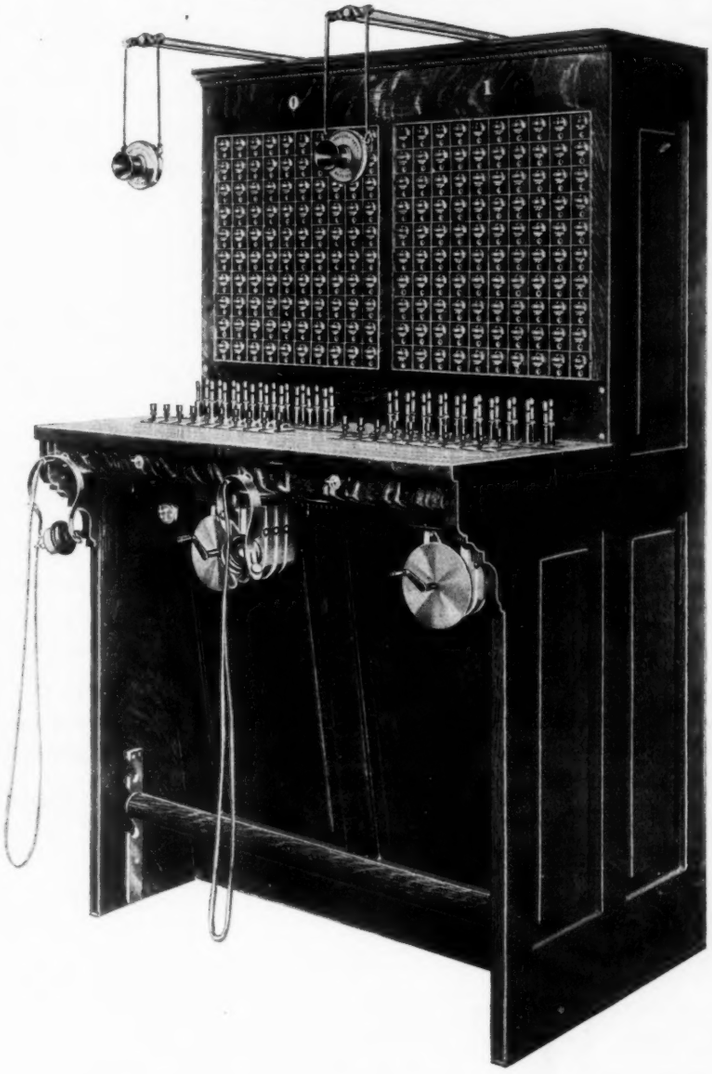
or of
CENTRAL
TELEPHONE &
ELECTRIC CO.
ST. LOUIS - DALLAS

P. S.—Our Bulletin 28 shows complete line of lightning protective devices. All good. Like all our bulletins free for the asking.

200 Line Switchboard with 200 Unit Type Self-contained Drop and Jacks installed



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Type of Drop and Jack used in above Illustrated Switch-Board
Note Coil Removing Feature

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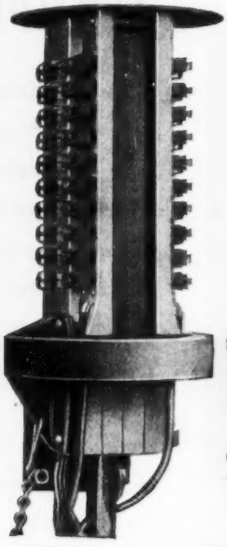
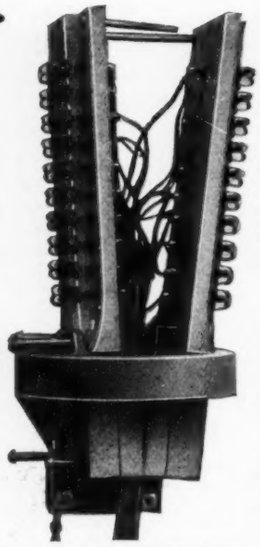
AMERICAN MICA FUSE CABLE TERMINALS

(NO POT HEAD REQUIRED)

Cover on



Type "F." Cover removed



How the work is done

On this page are shown three views of a new American Cable Terminal, known as type "F," and designed for any kind of cable, especially paper cable. It is not necessary to have a cable splicer to wipe a lead joint. It cuts out the expense of a self-soldering nozzle, and any man, even with no previous experience, can connect up his terminal. No pot head required.

Extra large carbons are furnished and the fuse protection is the American Patented Enclosed Mica Fuse, mounted in heavy brass Western Union clips of a new pattern, on hard maple strips made moisture proof by a special process.

All parts are held together by heavy bolts. To connect the cable you first loosen all bolts and raise the front and back slides. Then insert the cable between the clamping blocks at the bottom, first removing the lead sheath to the proper distance; then solder the cable wires to the clips as shown in last illustration.

Cork the cable at the bottom of the terminal, then tighten up the bolts and fill the center compartment with cable compound. This makes the safest pot head possible, made in the cheapest and quickest way.

The fuses are mounted on $\frac{1}{2}$ inch centers. A 10-pair terminal measures from top of can to lowest part of the casting. $14\frac{1}{2}$ inches. The can itself measures $12\frac{1}{2}$ inches in height by $6\frac{1}{4}$ inches in diameter.

First illustration shows a 10-pair terminal with cover on; the second, a 10-pair terminal completely connected up but with cover removed; the last illustration shows the process of wiring up. The ground wire is soldered to a heavy ground plate and the bridle or jumper wires are attached to heavy screw binding post in the rear of the terminal.

The cable connects to the carbon side of the line and the jumper wires to the fuse side.

AMERICAN ELECTRIC FUSE CO.

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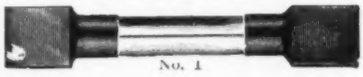
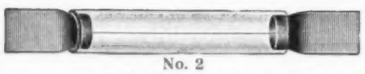
The CONDITION of the FUSE

SEEN AT A GLANCE THRO THE GLASS



No. 1



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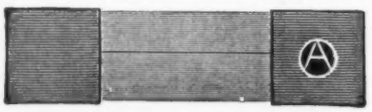

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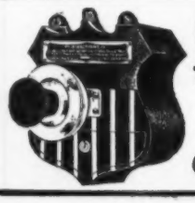

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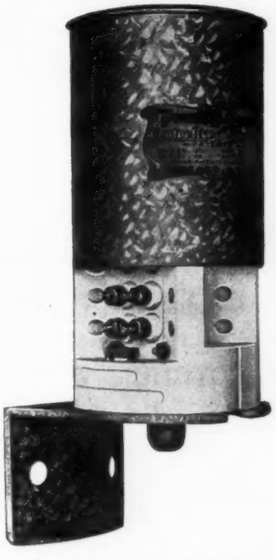

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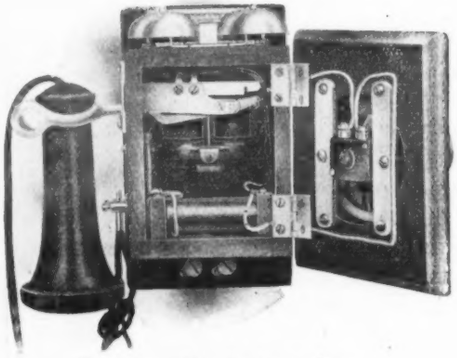
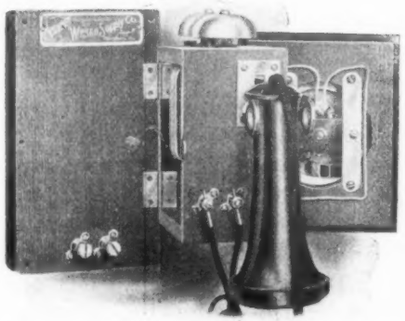


Door Open, Showing Interior View

Lamp Line Equipments for Hotels, Schools, Etc.



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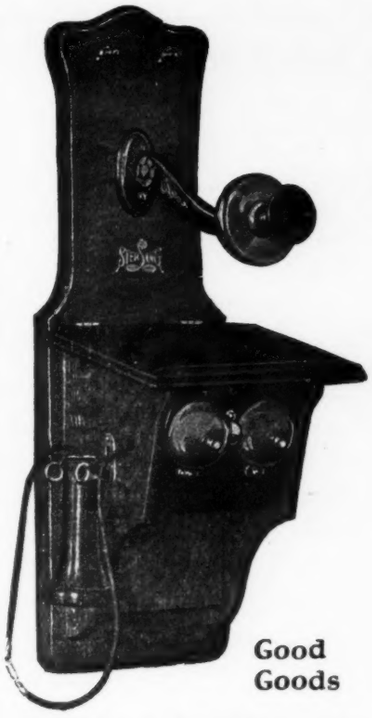

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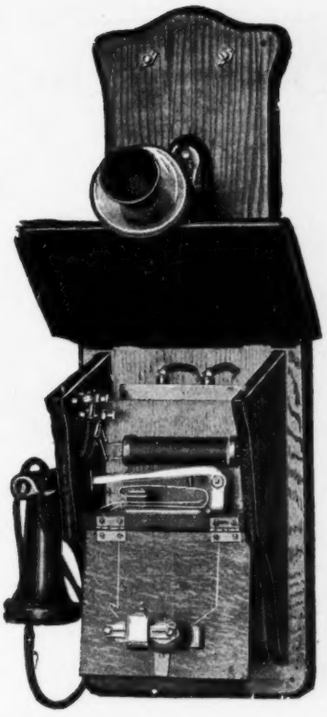

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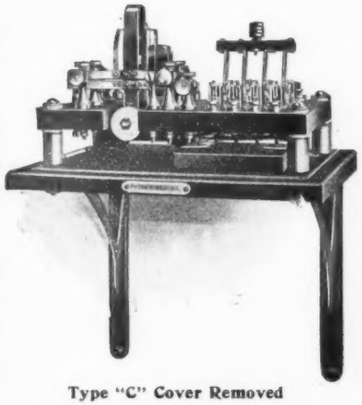

Type "C" Cover Removed

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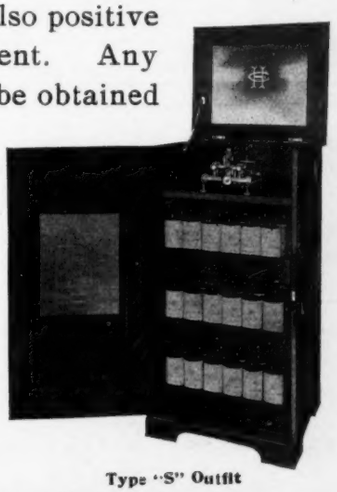

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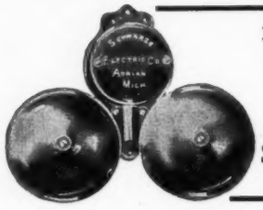

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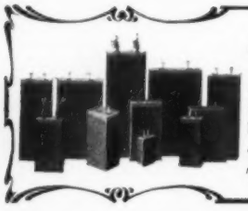

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Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine and The Telephone

Vol. XVI — CHICAGO, SATURDAY, OCTOBER 17, 1908 — No. 10

PUBLISHED EVERY SATURDAY BY THE

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Edited by H. B. McMeal and Franklin H. Reed

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Vol. 32	Telephone Magazine	No. 10
Vol. 18	American Telephone Journal	No. 16
Vol. 16	Sound Waves	No. 10
Vol. 16	Telephony	No. 10

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CHICAGO, SATURDAY, OCTOBER 17, 1908

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The December Telephone Convention.

Apparently everyone is agreed that the telephone business will be one of the first to feel an improvement, as general business conditions approach a normal range of activity, and that development and construction work will be going ahead at a first-class pace in the next few months. Plans of individuals for attendance at the forthcoming convention of the International Independent Telephone Association are another indication of the general attitude of belief in a period of greater prosperity than has ever before been experienced in the industry. Already more rooms are engaged at the Auditorium, in Chicago, than have ever before been taken so far in advance of a convention. And this is so even though the program has not definitely been settled upon, nor the leading topics of discussion named.

It is well known that more important developments of interest to the entire field, speaking geographically, and to both the large and small operators, will be considered, formally or informally, during this convention, than have been the object of interest for some years past. The activities of the Association have been considerably broadened in recent months, and its prominence as a factor in telephone development is receiving general attention from business interests through the entire country.

The attendance will undoubtedly be large, and the number of active men whose intention of participating in the proceedings may definitely be predicted promises well for the value of the meeting to the entire field. This year a manager can be sure of being able to give his company full value for the expenditure of time and money involved in a trip to the convention from even the most distant point.

About Personal Matters.

The men who write out their ideas, and put them before other men on paper, know how seldom an article gets so close to actual conditions in a broad field that nearly everybody will instantly admit the accuracy of the statement. In other words, we say it is hard to write in such a way as to "reach a man where he lives." And, when this is actually done, it is one of the good traits of human nature that the reader always has a feeling of warm, personal interest in the man who has well put into words a bit of helpful common knowledge.

Now, telephone men are so divided into groups and classes by the specialization of their work that few published arti-

cles interest them all. But an agreeable exception seems to have been the editorial under the title "The Doctrine of Definiteness," published in our issue of October 3rd, which, to reveal one of our editorial secrets, was written by Professor Smith, of Purdue University. His statement gets right down to the fundamental relations of a man to his work, and so is being read, and passed along, and re-read, in many telephone exchanges. Our readers seem to think it a bit of writing which is worth while, and we are glad to have them confirm our own opinion.

Saving the Trees.

Telephone companies would be very glad to do away with tree trimming altogether. It costs money, and breeds discontent. But when there arises a question of cutting the tops or branches off the trees on a certain street, or else putting in high poles or cables on a lead which will barely pay for itself, there is a disposition to sacrifice the trees and take the consequences. And if the manager anticipates objections from users of the street, the instructions are likely to be in favor of doing an extra amount of cutting so that maintenance expense may be kept down for two or three years to come, and the trouble from the public may all come at once and not be a constant source of discussion and expense, as may be anticipated when the hacking is done on the piece-by-piece system.

As a matter of fact, between the public and the wire-using corporations there is a good deal of unreasonable action on both sides of this question; and when anything like a practical way out of the obvious difficulties attending the practical solution of the problem is presented, it is likely to find both parties ready to work to put it into effect.

The city of Los Angeles seems to have done very well in its appointment of a city forester to deal with this question. With an honest, fair man, who knows his business, in such a position, both the public and the telephone company are protected, and the expense is well divided, too. While the wire-using company may have to bear a little heavier burden by increasing the cost of construction as a result of some of the forester's rulings, it reaps a reward in the augmented favor with which its method of dealing with this question is regarded by users of the streets. In shifting the responsibility for such damage as must inevitably be done occasionally upon the shoulders of an official paid by the city, the company puts itself in a position where it is practically immune to criticism.

Economy and Good Service.

The difficulty of following the line of true economy in balancing the somewhat complicated elements of operating room expense and operating room service is well emphasized in Mr. Putnam's article printed upon other pages. This article, fortunately, does a good deal more than to aggravate the sufferer's discomfort by dwelling upon the symptoms of the malady. It sets forth in very clear terms the method of applying a remedy.

It is true enough that the remedy is not a new discovery, as measured in periods short enough to suit the rapid march of progress in telephone exchange administration. Peg counts have been taken in exchanges varying in size from one position to the largest for a long time now, and for all exchanges large enough to make the variations in traffic sufficient to equal a proper load for one operator or more, it is recognized as good practice to plot the traffic curve, and use it. But the mutual appreciation of the value and possibilities lying in this method of study, by the operating force on one side, and the management on the other, may not be as well developed now as it will be in the near future. The management does not always appreciate that this is a kind of theorizing which pays—representing, in fact, a very short cut in the determination of the amount of expenditure for operating room wages which is neither too large nor too small. Nor, on the other hand, is it always possible to find a chief operator who has devoted sufficient time to the analysis of traffic curves to be able to work out their proper application. It is not realized how definitely they help in the solution of problems of distributing operators in such a way as to best care for the load from hour to hour, while providing a sufficient reserve to meet all abnormal conditions which past experiences have shown may be expected to arise under circumstances which can, as a rule, be foretold in advance by a person alive to the movement of current events in the district served by his exchange.

Mr. Putnam's article is a very clear exposition of the economic value of this method of studying the work of the operating force, to say nothing of its worth in affording an insight into the actual methods of analysis likely to be adopted by the chief operator who is capable of carrying on this work efficiently.

Helpful Publicity.

It is very cheering to see the newspapers printing good, live, uplifting news about the telephone business. And it does not all bear the trademark of the press agent, or have the factory-made appearance of the material worked up in stereotyped phrases from thread-bare ideas such as is so frequently put out by the paid publicity agency, whose employees have no intimate knowledge of telephony.

Much of this live material which is getting into the newspapers nowadays, is furnished by Independent managers, and printed solely because it is good news. The newspaper men are beginning to realize that the telephone service is such a factor in the life of the people who read the newspapers that any facts about the methods of furnishing the service or improvements which are being made by the telephone companies, are the best kind of news. It may be the case that some of the telephone managers are behind the newspapers in their realization of this, and do not furnish as much material as would cheerfully be printed if given to papers, written fairly and in interesting form.

The public actually does want to know whether the telephone business is a good business, and whether the telephone companies are doing all they can to improve the service. People want to know what kind of improvements are being put in, and what the users of the service can do, themselves, as a means of getting better treatment from the companies.

The Traffic Curve from the Chief Operator's Viewpoint

By John Putman

It is not very many years since the time when the relation between the number of operators on duty and the number of calls handled was but hazily understood. Much progress in this direction has been made, still leaving, however, much to be studied and many problems to be solved in connection with this question. So recent, indeed, has been the study of this subject that one might say that its scientific beginning took place about five years ago. Previous to that time call counts were taken and sent along to headquarters as directed, but that was about all that happened. The chief operator paid more attention to the number of calls per position than to the ability of the operators, or to their team work; in fact, some of the operators in bygone days would have felt hurt if they had been asked to answer a call received on an adjacent operator's position. As for the adjustment of operators' hours the individual chief operator made his adjustment as he thought best, and frequently with more regard to the desires of the operators than to the needs of the service.

Autres temps, autres moeurs! Now, when the call count goes to headquarters, back comes the traffic curve as a guide, mentor and friend to the chief operator. The traffic curve might be defined as a graphical representation of the adjustment of the operating force to the traffic. It shows whether the force is over-sufficient or insufficient, and, as an immediate consequence, whether money is being spent wisely or unwisely on operating. It also gives an excellent idea as to whether a chief operator is adjusting his force to the varying business due to climatic and business changes of the varying seasons. To give a slightly closer description of the curve, it may be said that it is one, plotted on "detail paper," connecting points whose abscissae are the hours of the day and whose ordinates are the observed number of calls handled per hour. Superimposed upon this curve is one whose abscissae are the hours of the day and whose ordinates are the number of operators required in each hour, as determined by a consideration of their ability to handle a varying number of calls according to the number of positions covered.

The telephone call might be termed the unit of telephone traffic. By the number of calls handled per hour an operator's ability is determined. The telephone circuit, unlike the power circuit, is inflexible. When it is in use for a conversation, more talking traffic cannot be placed upon it. So it is with the operator's handling of a call. She can handle but one at a time, and the facility with which she can handle connections depends much upon the way in which the business comes. On flat rate, or unlimited service work, an operator can answer and complete a maximum of from five to eight calls a minute. This would be at the rate of

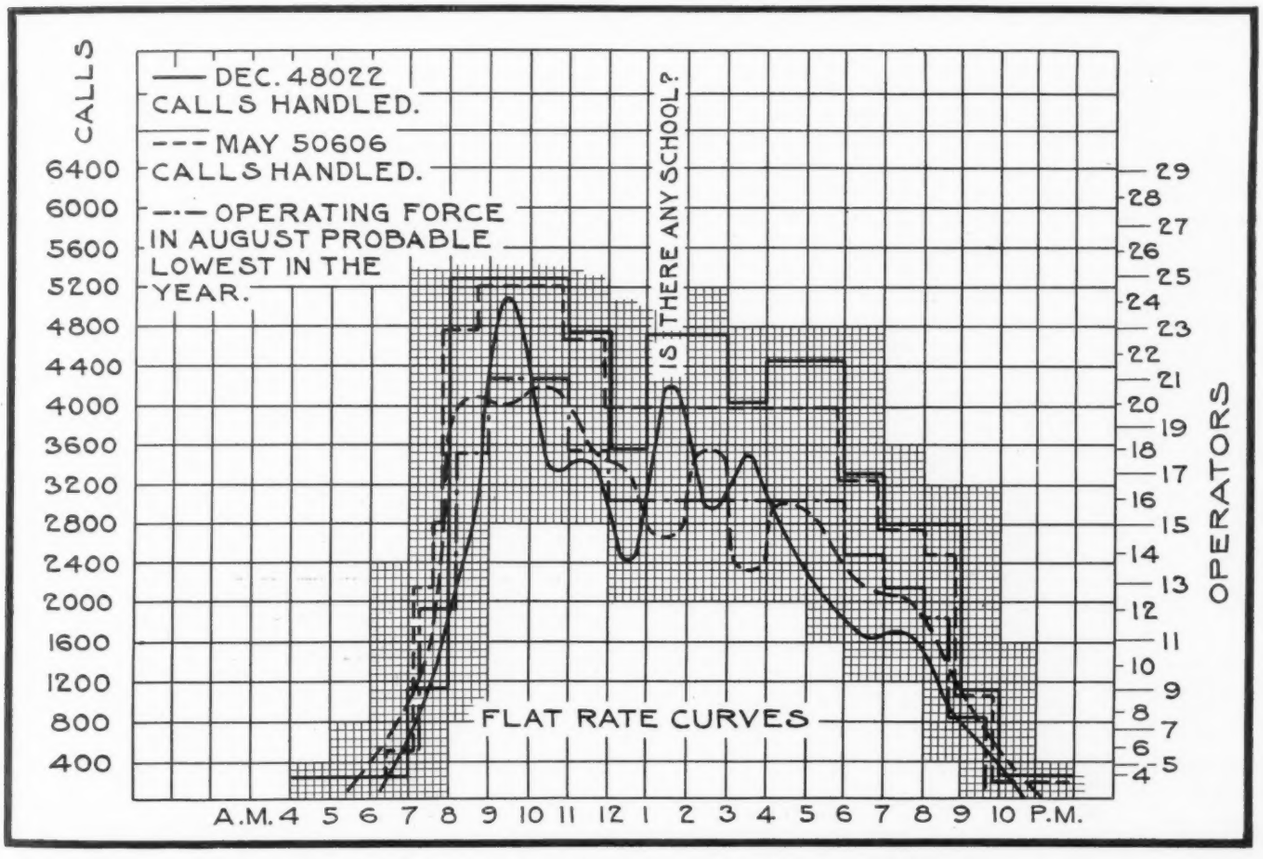
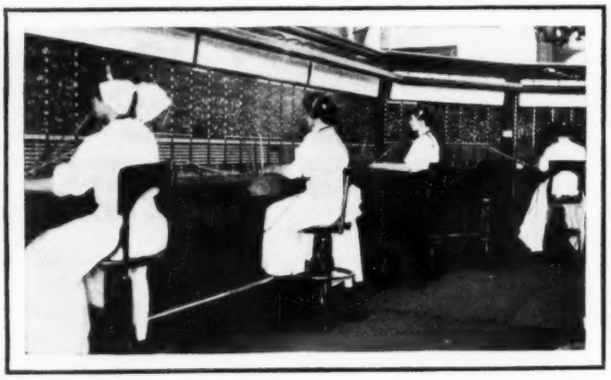


Fig. 1. Flat Rate Curves Showing Relation Between Traffic and Operating Force.

300 to 480 calls an hour. Observation would quickly show, however, that such a calling rate would result in congestion of the service as a very slight hold-up of the operator on the part of a subscriber would put her behind her work, and with calls coming in at such a rate, the service would soon fall to pieces. Other factors also enter into the determination of the operator's ability. The personal equation, as made up by the operator's training, experience, temperament and supervision is one. Another is the type and design of the switchboard, the number of party lines in the plant, the method of ringing, and the quality of the maintenance as manifested in the trouble clearance. A third factor might be the operator's surroundings; the lighting and ventilation of the operating room, comfort of retiring and dining rooms, her hours, and care of her own health. It will be realized, then, that the proper determination of the number of calls per hour that an operator can handle and give good service, is no easy matter. It can only be found by a large number of observations and much experimenting. For flat rate work the following table will be found to be approximately correct.



A Sunday Force: During the Week Day Busy Hours, There are Fifteen Operators on this Section of Switchboard.

An operator covering:

One	position	can	handle	220	flat rate	calls per hour.
Two	positions	can	handle	161	flat rate	calls per hour.
Three	positions	can	handle	130	flat rate	calls per hour.
Four	positions	can	handle	105	flat rate	calls per hour.
Five	positions	can	handle	82	flat rate	calls per hour.
Six	positions	can	handle	67	flat rate	calls per hour.
Seven	positions	can	handle	56	flat rate	calls per hour.
Eight	positions	can	handle	49	flat rate	calls per hour.
Nine	positions	can	handle	44	flat rate	calls per hour.
Ten	positions	can	handle	40	flat rate	calls per hour.
Eleven	positions	can	handle	36	flat rate	calls per hour.
Twelve	positions	can	handle	33	flat rate	calls per hour.
Thirteen	positions	can	handle	31	flat rate	calls per hour.
Fourteen	positions	can	handle	30	flat rate	calls per hour.

An operator handling message rate, or measured service, with a registering device at the subscriber's station, can take care of one call for every 1.4 flat rate calls. One handling pay stations with coin collecting mechanism, can handle business at the rate of one such call to two flat rate calls. From these ratios the traffic curve may be easily equated. It goes without saying that the load on positions should be as even as possible, and that team work, or the ability to answer calls on other positions either in answering or multiple jacks, should be good. The decreasing ratio in the operator's ability to answer calls as positions are uncovered is evident from the table. Observation from the floor of the operating room will quickly confirm this. The operator will most quickly get the call directly in front of her, and any tendency toward delay will be experienced on those calls coming in on the vacant positions. While open positions may give a good average central answer, they tend to make the service less uniform, i. e., produce longer waits on some calls. On the contrary, if the positions are filled and the operators not busy, the resulting inattention on their part will slow down the service.

Carlyle says, in his essay on Burns, "We become men * * after we have ascertained, in any way, what impassable barriers hem us in through this life." There are many barriers surrounding operating room methods. The question arises whether, with the foregoing figures, we can adjust our operating force to the resultant traffic curve. Provided the operating force is experienced, it undoubtedly can be done. First some idea must be had of the service it is desired to give This, to a great extent, is determined by the traffic in the "busy hour," usually 9 to 10 a. m. in offices in a business dictrict. If it is desired to give a 3½ second average central answer, it will probably be found that the load on positions should be about 180 calls in the busy hour, and about 1,700 for the day. Floor supervision should be at the ratio of one supervisor to eight operators on duty. A five second service is probably as satisfactory to the average subscriber, in which case the busy hour load may be brought up to 220 to 240 calls, and the daily load made from 1,700 to 2,000.

When traffic curves are printed as samples, showing the operating force exactly fitting the traffic, it is safe to say that such curves are the result of one of two occurrences; they are forced; or "it happened so" on one particular day. Possibly they are the result of a combination of two circumstances, main strength and good luck. A reference to, and study of Fig. 1. will show why this is so. The solid lines show a traffic curve and operating force made up for flat rate service from a call count made in December, 1907, in an office of 10,000 telephones. The dotted lines show a curve and force for a day in May, 1908. While the normal and expected peak in the traffic takes place from 9 to 10 a. m., as the curve shows it, on the December day, in May there was as much business from 8 to 9, as from 9 to 10 a. m., and an increase of business from 10 to 11. Noticing other peaks in the traffic curves we see that in December there were sharp rises in business between 1 and 2, and 3 and 4 p. m. It is an odd circumstance that the heavy traffic between 1 and 2 was due to a severe rain storm, and a resultant rush of children to ask "Information" if there was any school. In May, the peaks in the traffic in the afternoon came from 2 to 3 and 4 to 5. Two things are common to both curves, a falling off in the number of calls at noon and from 5 to 10 p. m. It will be noticed that the operating force parallels these decreases in business. The force in May was more closely adjusted to the curve than in De-

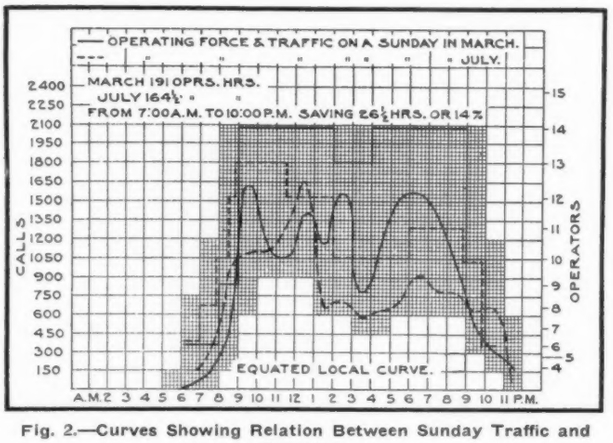


Fig. 2.—Curves Showing Relation Between Sunday Traffic and Operators.

cember and was, later in the year, dropped to the dot and dash line. The apparently superfluous force in December and May at certain hours of the day was directly due to the number of students in the operating body. These two curves bring sharply to notice another operating truth, namely, that a large daily business is not necessarily the hardest to handle. In May, 50,606 calls were handled in one day, but very easily, as the business came in evenly and constantly with no great hourly loads to contend with. The December day, when 48,022 calls were handled, was much more difficult for the operating room on account of the way the business "peaked up" at certain hours. Had the force been adjusted to either one of these curves, it would not have fitted the other. In the interests of good service, then, let the chief operator have a sufficient force to meet most possible demands upon it, while, at the same time, paralleling his operating force with the traffic curve as made up by several days' observations. It is not so much the money one spends that causes regret, it is the money spent foolishly. The former might be economy, the latter is always waste.

The application of the traffic curve to the force needed on Sundays is also of great value. It is doubtful if many in authority in traffic matters are closely in touch with the needs of the operating room on Sundays. A call count by operators made once a month will enable the chief operator to get figures for the curve, which will show at once how closely the Sunday force is adjusted to the traffic. This Sunday traffic varies greatly with the time of year, being heaviest on storm days in winter, and lightest on fair days in summer. The peaks in the Sunday traffic cannot be depended upon to come in the same hours with the regularity that they do on week days. Fig. 2 shows a traffic curve and one for the operating force on a Sunday in March, upon which are superimposed curves for a Sunday in July. The difference in traffic is particularly noticeable in the afternoon, while the operators' hours in July amount to 14 per cent less than the hours in March. It will be noticed that the line of traffic in July is ahead of that in March and keeps up later in the evening. This takes place as daylight grows longer, and the operating

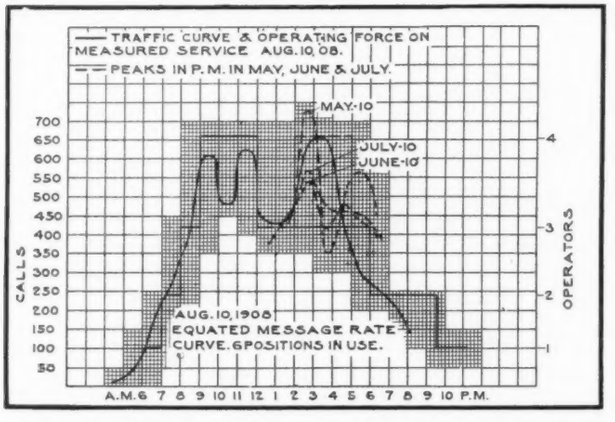

TRAFFIC CURVE & OPERATING FORCE ON MEASURED SERVICE AUG. 10, 08.
PEAKS IN P.M. IN MAY, JUNE & JULY.
MAY-10
JULY-10
JUNE-10
AUG. 10, 1908
EQUATED MESSAGE RATE CURVE. 6 POSITIONS IN USE.
CALLS
OPERATORS
A.M. 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 P.M.

Fig. 3.—Equated Curve Made up for 6 Positions Handling Measured Service.

force has to be brought in earlier mornings and kept later evenings to meet it.

It is an operating axiom that the service is not affected by increase in the number of calls answered by the "A" operator up to the number which overloads her. Even when she is overloaded, with good team work, others will come to her assistance, and a properly trained supervisor will immediately pass a waiting number by calling it to operators at a distance who are disengaged. It is also a fact that busy operators give the best service because their attention is fixed upon their work. Against these propositions are erected two barriers. The question immediately arises as to what is an overload for the individual operator, and the consequent breakdown point of the service. This will vary with the operator's experience, and individual ability, and the effectiveness of the supervision. But, on the whole, the figures given in the table in this article will

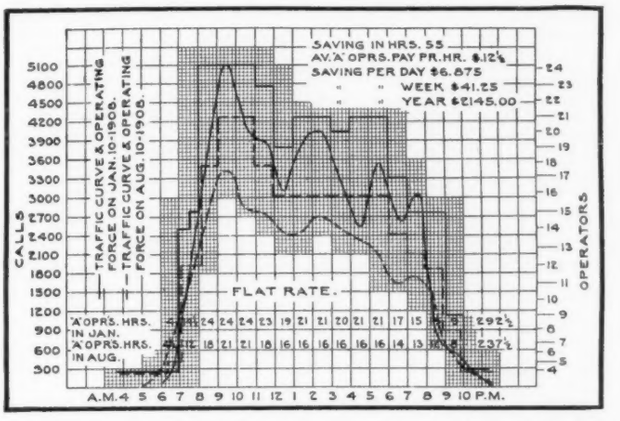

SAVING IN HRS. 55
AV. 'A' OPRS. PAY PR. HR. $.12½
SAVING PER DAY $6.875
" " WEEK $41.25
" " YEAR $2145.00
TRAFFIC CURVE & OPERATING FORCE ON JAN. 10-1908.
TRAFFIC CURVE & OPERATING FORCE ON AUG. 10-1908.
FLAT RATE.
'A' OPRS. HRS. IN JAN.
'A' OPRS. HRS. IN AUG.
292½
237½
CALLS
OPERATORS
A.M. 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 P.M.

Fig. 4.—Savings Effected by Intelligent Use and Study of Curves.

be found very satisfactory. As to team work, while it is rare that every operator of a group is busy at the same instant, the effectiveness of this proposition depends much upon the size of the group. When the operators are seated to cover two, three, four or more positions and a number of calls come in at the same time, some subscriber has got to wait from five to ten seconds, or longer, for an answer.

The traffic curve is as valuable in showing where the switchboard has too few operators as to indicate where it is overpeopled. Fig. 3 shows an equated curve made up for six positions handling measured service, the call registering apparatus being at the subscribers' stations. It will be noticed that but four operators are on these positions during the busy hour. This is made possible by the low calling rate from these subscribers, it being but 2½ calls per station per day against 5 or 6 per station per day, for flat rate or unlimited service. In addition to this, the business from measured service stations is more evenly distributed throughout the day, the subscriber using his telephone as necessity demands, and not as the whim seizes him. The traffic curve and operating force line of Aug. 10 show a shortage of one operator from 2 to 5 p. m. In order to determine whether this afternoon peak in the traffic was abnormal or not, the traffic curve for May, June and July was plotted on the same sheet, as shown, and one operator was added to these positions from 2 to 5 p. m. The peak in traffic between 5 and 6 p. m. for May 10 was evidently abnormal, as the three other curves do not show it.

Let us now take up a matter of great interest to the men behind the guns, i. e., those furnishing or handling the money. Fig. 4 is presented in order to show the money-saving power of the curve. The operating time necessary to hold the traffic in January amounted to 292½ "A" operator-hours from 6 a. m. to 10 p. m. In August the traffic had fallen off so that 237½ operator-hours were sufficient to handle the calls. This is a difference of 55 hours a day. The average "A" operator's pay being about 12½ cents an hour, this would effect a saving in money of $6.875 a day, or $41.25 a week, and if continued for a year, would amount to $2,145.00. In speaking of Fig. 2, we remarked that there was a saving of 26½ hours on a Sunday. In money at the above rate this would amount to $3.30. It might be ob-

jected that this was not much of a saving for a large operating room, but let us stop and think what this amount of money will do. At 6 per cent it will pay a year's dividend on $55.00 worth of stock, and, if continued for a year of 52 weeks, it would pay the dividend on $2,860.00 worth. Right here it might be a good place to remark that the chief operator is usually between the devil and the deep sea; the devil of expense, and the deep sea of poor service. As he edges away from one, the other reachs out to grab or engulf him. Blessed is he who can run an operating room to the satisfaction of the subscribers and with economy to the telephone company, and go his way, even tempered and unworried.

From the chief operator's viewpoint, then, the traffic curve is of great value for two reasons; it will enable him to intelligently adjust his force to the traffic as it increases or decreases with the seasons, and it will guide him in adjusting the force throughout the day. In general, the curve of operating force should follow the shape of the traffic curve, its distance above it depending upon the efficiency of the force as a whole. If the operating force is adjusted below the traffic curve, look out for poor service. Changes in the operating schedule should be tried out before being put into effect, and observation from the floor of the room should be made to confirm any theoretical adjustment of the force.

When a call count is taken, the curve, as made up from the count of the previous month, should be taken from the files, and the new curve of traffic should be superimposed upon it. The needed operating force can then be determined and the operators' time sheet made up to conform to it. If this is a decrease in force, the new schedule should be tried out through the different hours of a day by excusing operators from the board and holding them in the retiring room, or placing them on relief. Then, if the service rendered is satisfactory, as shown by observation or silent tests, the new adjustment of hours may be put into effect.

In the article the traffic curve as applied to only local traffic, has been considered. By determining the ability of the toll operator, when performing the various functions of toll operating, and under various toll operating methods, we are enabled to apply it to toll work. That, however, is another story, and must await some other time for its telling.

Telephone Cables.

In the use of telephone cables, a low electrostatic capacity is desirable; indeed it is very essential where telephonic transmission has to be conducted over long distances. Telephone cables are made commercially with capacities ranging between 0.12 and 0.08 microfarads per mile. The size of conductors employed runs from No. 22 to No. 13 B. & S. gauge. Recently there has been considerable demand for the larger sige wires, such as No. 16, 14 and 13. Such wires are generally used for toll and long-distance service.

Practically all of the Bell Telephone Company's specifications require a mutual capacity test. By this is meant the capacity between one wire of a pair and its mate, with the other wires connected to the lead cover of the cable. This capacity is about two-thirds of the capacity by the old method, which consisted in testing each wire against all the other wires grounded to the lead cover of the cable. Some of the recent requirements on No. 16 and 13 wires specify a mutual test of 0.065 microfarads per mile.

With the use of the Pupin coils for helping to neutralize the effects of capacity, it was found that telephonic disturbances due to a condition of unbalance between adjacent pairs in a telephone cable were greatly accentuated by the use of said coils. An apparatus was, therefore, designed by the Bell Telephone Company for measuring the amount of unbalanced capacity between wires of adjacent pairs, and this led to a new specification whicsh required that the average mutual capacity unbalance between adjacent pairs should not exceed 0.000025 microfarads. By exercising extreme care and special methods of manufacture the above specifications can be complied with.

* Abstract from a paper presented by Henry W. Fisher at a meeting of the Pittsburg section of the American Institute of Electrical Engineers.

Broken Guy Wire Lets Down Three Poles and Injures Persons.

A case where the factor of safety in line construction was altogether too low is indicated by an accident to the plant of the Missouri & Kansas Telephone Company in Kansas City. The sudden snapping of a guy wire is said to have allowed three poles to break. They were heavily loaded with cables, and, when they collapsed, three persons who were passing beneath the wires in a carriage were seriously injured.

Economy in Exchange Management.*

By D. C. Clark.

We all know of some exchange, with which we have connection, where the quality of service could be improved by discarding an old, worn-out board which has been in use, and repaired and overhauled by every so-called *expert* repair man who has come along for the past ten years. To get a connection, through this board, to the neighbor on the other who has kept up with the times in standard improvements and modern equipment, is perhaps well-nigh impossible. Would it not be true economy to shorten up the expense account by stopping the installation of new telephones in such an exchange until sufficient funds were raised to put in a new board of modern make, thereby benefiting not only this particular exchange, but also the neighbors on each side?

Another way to economize on a switchboard is by not buying a cabinet just a little above present needs. The exchange will surely grow. Where is there a man in the business who ever laid off a pole lead that was too heavy? But few have not gone through the experience of being compelled to rebuild completely inside and out. That was poor economy, but let us take a lesson from the past, and, for the future, economize rather by overbuilding than holding to the absolute necessities of the day. For the man who builds with an eye to the future, and provides ample pole line and switchboard capacity will just as surely get the business as the sun will come up tomorrow morning.

The best way that I can see to fight competition of the "free service" and "dollar a year" class, is to build with an eye to the future, in which no one can see anything but an increase in the demands made on the exchange for service. The public is constantly demanding service of a better quality, and whoever is able to meet these demands and deliver the goods will find a ready sale for his product.

In the matter of toll lines and tolls, I have found to my loss that one can economize on operators very extravagantly sometimes. In my exchange I have free service to adjoining towns for all subscribers. I had to change operators, because my old operator, who knew all the subscribers, and which should pay tolls, had to go to a distant station. I got another one of them at 25 per cent less wages, and, after carefully training her for what I thought to be a sufficient length of time, turned the work over to her, only to find that at the end of the first month I had lost 75 per cent of my former average of tolls, and at the end of six months was not able to bring the business back to its normal condition. This loss was occasioned by the op-

*Abstract of an address to members of the Missouri Independent Telephone Association, at the Springfield district meeting.

erator's not knowing how and when to get people at distant points, and also by her failing to recognize when a toll message was going from some store or private telephone.

There are a great many ideas that could be given a place in a talk on economy in operation; for instance, batteries, lightning protection, the kind of a troubleman it is economical to keep, etc. Batteries are no small item in the expense account of any well-conducted exchange. There are batteries on the market of many names, some good and some better, but they are not to be spoken of as the backwoodsman mentioned whiskey, "I have seen some whiskey better than other kinds, but it is all good."

Batteries can be bought at various prices, from 8 or 9 cents up to 20 cents apiece by the barrel, all guaranteed. But the question is—which kind will last longest in the service they are required to give on farmers' and party lines. It is not a question of "how many months will the can hold the paste before it gets blisters on the outside," thereby fulfilling a twelve months' guarantee, but rather of the length of time during which a pair of cells will furnish sufficient current so that Farmer Jones, ten miles out, can talk to produce dealer Smith in town, and have the conversation good, clear and intelligible. It is not good zinc cans we are buying, it is "juice." I have found it good economy to buy some good make of pocket battery gauge, or a combination volt and ammeter, and, by keeping this in the repair kit, avoid many an extra trip to the country to replace batteries. The running down of the battery at an inopportune time is frequently the only trouble, and testing it when other inspections are made enables the company to economize to a wonderful extent in team hire and trouble men's time. This one item alone of replacing worn batteries will make an expense account that would surprise some managers if a strict account of the expense of this one job of the trouble man were kept separately from the balance.

A Primer of Wood Preservation*

By W. F. Sherfesee

The cost of wood is today a big item to everyone who must use timber where it is likely to decay. How to reduce the expense of fence posts, railroad ties, mine timbers telephone poles, and other timbers which must constantly be replaced has become a vital problem. The kinds of timber used for these purposes are becoming scarcer and scarcer and their prices higher and higher. Long misuse of the forest has brought its sure result. Even with the most efficient management it would be a long time before the supply of the best timbers would increase in quantity or decrease in price.

There are two ways in which the situation may be met. One is to prolong the life of the forest by wise use; the other is to prolong the life of timbers in service by treating them with some preservative. It is the second of these methods of economy which is the subject of this circular.

It is easy to see that if the length of time timbers can be used is doubled, only half as much timber will be required as before and only one-half as much money will need to be spent in the purchase of timber. This is the chief gain in treating wood with preservatives. Yet there is another and important one. Many woods, which for a long time were considered almost worthless, can be treated and made to last as long as the scarcer and more expensive kinds. This of course means that the consumer will have the choice of a much greater number of woods than he had before and at less cost.

Wood preservation, then, prolongs the life of timbers in use, reduces their cost and gives to the user a wider choice of woods than ever before.

Methods of preservation must be varied for different localities and different kinds of wood, and the Forest Service has issued several publications which deal with the problems presented in different regions. These publications and detailed information can be had upon application to the Forester.

WHAT DECAY IS.

The decay of a plant body, such as wood, is not an inorganic process like the rusting of iron or the crumbling of stone, but is due to the activities of low forms of plant life called bacteria and fungi. Bacteria are among the simplest of all forms of life, often consisting of but a single cell, microscopic in size. Sometimes several such cells may be attached to each other, and so form a thread or filament. Usually they are colorless, and multiply by the division of the parent cells into other cells, which, in turn, divide again.

Fungi, although much more complicated than bacteria, are also low in the scale of creation when compared with familiar flowering plants and shrubs. They consist merely of tiny threads or hyphæ, which are collectively known as the mycelium. In many of the higher forms of fungi the threads grow together to form compact masses of tissue. Familiar examples of these forms are the toadstools, which grow on damp, rotting logs, and the "punks," or "brackets," on the trunks of trees in the forest.

The causes of decay in wood, however, are not these fruiting bodies themselves. Spores, very primitive substitutes for seed, which are borne in the countless compartments into which the under surfaces of the fruiting bodies are sometimes divided, are produced in infinite number, and are so fine that they can be distinguished only by the microscope. When seen in bulk they appear as the finest dust. Like dust, they are carried by the wind and strike all portions of the surrounding objects. Few species of fungi successfully attack healthy living trees, and only a comparatively small number can attack and destroy wood. Yet the spores of some find a lodging in dead portions of a tree or in cut timber, and, if the wood is moist and in the right condition for the spore to grow, it germinates and sends out a thin, filmlike white thread, which, by repeated branching, penetrates the entire structure of the wood. These are the real agents of decay.

This is not the only way that a fungus can enter a sound stick of timber; for if a good stick is lying close to a rotting one, the mycelium may grow over or through the moist ground and so reach the sound stick, which it immediately attacks. Sometimes, too, when a tree is cut it already has a fungus growing in its wood. If the fungus happens to be a true parasite—that is, if it can grow only in living tissues—it will die when the tree is felled; but if it has been accustomed to growing in the heartwood of the tree, which is practically dead, it may continue to live and develop even after the tree has been sawed into timber.

Wood is composed of minute cells. The chief material of the cell-walls is a substance called cellulose, and around this there are incrusted many different organic substances known collectively as lignin. Most of the wood-destroying fungi attack only the lignin; others attack the cellulose alone, while a third class destroy all parts of the wood structure. The lignin and the cellulose are dissolved by certain substances secreted in the fungi, and thus serve as food for the fungus growth. In this way the fungi can develop until they extend throughout every portion of the timber. After a time the amount of fiber changed into food and assimilated by the fungus causes the

*Abstract of a circular issued by the U. S. Forest Service.

wood to become discolored. Discoloration may also be produced by pigments in the fungus or secreted by it. Finally so much of the wood fiber is eaten away or changed in composition that its strength is greatly diminished, the texture becomes brittle and disconnected, and the wood is said to be "rotten."

But food is not the only thing that a fungus requires for its growth and development. It must also have heat, air, and moisture. If any one of these is lacking the fungus cannot develop. The necessary heat is supplied by almost every climate, and it is only in rare cases, as under water or deep under the surface of the ground, that air can be excluded from the timber. Of the four requirements, therefore, two are beyond control. It is only by depriving the fungi of food or moisture that the great destruction which they cause in timber of all kinds can be prevented.

HOW DECAY CAN BE RETARDED.

By Seasoning.—The simplest way of prolonging the life of timber exposed to the attack of wood-destroying fungi is to reduce the moisture content of the wood. The amount of water in green timber varies according to the part of the tree from which the wood is cut. The outer layers of the trunk are composed of sapwood, the cells of which contain large amounts of organic substances which serve excellently as food for the fungi. Moreover, sapwood always contains a large amount of water. It is the portion of the tree, therefore, most susceptible to attacks from fungi. Heartwood, which can usually be distinguished from sapwood by its darker or more reddish color, contains, on the other hand, much less moisture. It is therefore more durable than sapwood. But because its pores are stopped up by gums and resins it dries out much less rapidly than the more porous sapwood. In almost every case as much care should be taken thoroughly to dry out the heartwood as in the case of the moister sapwood.

By piling the timber so as to permit free access of air all around it the moisture content of timbers of certain sizes can be reduced to about 15 or 18 per cent. Of course the climate has a great influence on the rate at which the wood dries out and the total amount of moisture it loses.

The moisture content of air-dry wood can be still further reduced by kiln-drying; and this is employed to a considerable extent, but usually for other purposes than increasing the durability of the wood. Moreover, either air-dry or kiln-dry wood has the power to reabsorb moisture when exposed to the atmosphere in damp situations, and so the benefits of drying, as far as durability is concerned, are only moderate. Yet the increased life which it gives is, in nearly all cases, more than sufficient to repay the added cost which may properly be charged to the seasoning.

The strength of partially seasoned timber, other thing being equal, increases as the amount of moisture it contains decreases. Thoroughly seasoned timber of small sizes is sometimes three or even four times as strong as the same timber, when green. Moreover, during the process of drying out, important but little understood changes take place in the organic contents of the wood cells, by which the wood is not only rendered less attractive to fungi, but is made more permeable and so better prepared for preservative treatment. All timber should be thoroughly seasoned before being exposed to decay.

An exterior coating secured by dipping a post in a thin solution of cement or other material that will harden on the post is not an effective protection, because in shrinking or swelling the wood forms cracks through which decay enters, and thus obtains a start.

By Chemical Impregnation.—By far the best method of checking the growth of fungi, however, is to deprive them of food. This can be done by injecting poisonous substances into the timber, and so changing the organic matter from foods suitable for fungi into powerful fungicides. It is a mistake to suppose that the germs of decay are inherent in the wood, and only need an opportunity for development to bring about its destruction. Several processes for the preservation of wood have been founded on the false assumption that it is necessary to destroy the "germs" in the interior of the timber. The impression doubtless arose from the fact that, after a stick of timber begins to rot, it is impossible to tell just where the fungus spores germinated and gained entrance into the timber. Moreover, the fact that the interior of the wood may have reached an advanced stage of decay before there are any external evidences of the fungi—such as fruiting bodies, or films of mycelium—tends to convince the casual observer that decay starts from the interior. Yet the wood-destroying agencies start from the outside. This explains the efficacy of certain paints which merely form a superficial coating over the surface of the timber, but which are poisonous enough to prevent the spores from germinating, or the hyphæ of most forms of wood-destroying fungi from penetrating into the unprotected wood in the interior. The ancients were in the habit of painting their statues with oily and bituminous preparations to preserve them from decay. The great wooden statue of Diana at Ephesus, which was supposed to have descended miraculously from heaven, was protected from earthly decay by oil of nard. Pettigrew extracted the preservative fluids from the heart of an Egyptian mummy that had resisted decay for over 3000 years, and found that decomposition immediately set in. This showed that it was the presence of the antiseptics which prevented decay, and not a chemical change of the tissues.

PRESERVATIVES AND PROCESSES IN THE UNITED STATES.

Of the many antiseptics which have been proposed for the preservation of timber only four have been largely used with success in the United States. These are creosote, zinc chlorid, corrosive sublimate (bichlorid of mercury), and copper sulphate. At the present time copper sulphate has fallen into almost total disuse, and corrosive sublimate is restricted to two plants in New England. The use of this latter is the so-called "kyanizing" process which is so frequently referred to in all the literature of wood preservation. In general, the process consists in steeping the timber in a dilute solution of corrosive sublimate long enough to insure thorough penetration.

Creosote and Zinc Chlorid.—Thus in the United States creosote and zinc chlorid are the only preservatives in common use. There are many other patented substances known by various names; but most of them have for their base one or the other of these two preservatives. Creosote is a by-product of coal tar, which is produced at most plants for the manufacture of illuminating gas and at by-product coke-oven plants. This tar is distilled, and during the process the condensed vapors are run into three separate vessels and thus separated into the light oils of coal tar or naphthas, the dead oil of coal tar or creosote, and pitch. Creosote is not a simple substance like zinc chlorid. On the contrary it contains a large number of constituents of great chemical complexity.

Wood tar, when distilled in a similar manner, gives "wood creosote," which like that derived from coal tar, possesses strong antiseptic properties. There is also on the market a so-called creosote, a by-product of water-gas tar or tar manufactured from kerosene oils, which for wood preservation is probably inferior to the true creosote. In general, however by "creosote" is meant the dead oil of coal tar.

Zinc chlorid is obtained by dissolving metallic zinc in hydrochloric acid. This is further diluted by water before it is used for wood preservation.

Just as there are two preservatives in common use, so there are two principal methods of injecting them into the timber. These may be called the "pressure-cylinder method" and the "open-tank method." A third process, known as the "brush method," is used to a more limited extent.

(To be continued)

Toll Cut-In Stations

By G. A. Joy and J. B. Thiess

Although the number of small towns and hamlets which are not favored with local telephone service is very rapidly diminishing from year to year, many districts may still be found throughout the United States in which the sole means of telephonic communication consists of a single line which is strung through the locality. Since this is probably the only means of keeping in touch with the neighboring villages and the world at large, it will stand to reason that a service of the highest possible efficiency should be maintained. However, we find that many such toll stations are nothing more or less than a telephone set bridged across the line, and when we consider that in all probability there are several like stations on either side of any particular telephone, it is easily understood why transmission on these lines is quite often very poor, in fact, we might say uncommercial. The bridging of these several instruments across the line will not only cut down the transmission, but also destroy the privacy of the conversation, for the addition of each telephone increases the probability that some one is listening in on the conversation. To run a separate line to each one of these villages is naturally out of the question, but on the other hand a slight outlay of money will very often tend to improve conditions considerably.

It is generally conceded that the transmission on any line should not fall below a well-defined standard, and, therefore, any scheme or device which tends to increase this efficiency is of great benefit, The fewer the telephones that are bridged on a line the better will be the transmission, owing to the fact that each additional telephone provides another path for the voice current. While the coils of an ordinary 1,000 ohm ringer offer a very poor path to the high frequency voice currents, owing to their retardative effect, still a very small portion of the current does leak across; and when this shunting effect is multiplied by 15 or 20, as it is when this number of instruments is on the line, then one begins to notice the effect at the receiving end of the circuit. While this effect is noticeable on speech currents, it is much more in evidence on the ringing current, as the ringer coils do not offer nearly the same impedance to the low frequency ringing current that is presented to the voice current. This is why it is so difficult to ring on heavily loaded lines. This condition may be relieved to a considerable extent by using higher wound ringers, these reducing the amount of current passing through each ringer.

Quite often a considerable amount of trouble is met with due to placing telephone ringers of widely different resistances on the same line. The low-wound ringer provides such an easy path for the ringing current that the high-wound ringer does not receive a sufficient amount to operate satisfactorily, if at all. Care should be exercised in having all the ringers on a given line of practically the same resistance. If the line is very long the resistance between the first and the last instrument may have the same effect as placing high and low wound ringers on the same line, that is, the ringer in the instrument nearest to the source of ringing current will receive the major portion of the current. This effect may be overcome by placing a ringer of higher resistance nearest the switchboard end of the line, and gradually diminishing resistances as the distance increases and thereby causing each ringer with its portion of the line resistance to offer the same resistance to the ringing current as the others. While this may be beneficial so far as ringing the telephones on the line is concerned, it has exactly the opposite effect for a party near the end of the line trying to get central; still a less amount of current is required to operate a drop than to ring a bell satisfactorily, and consequently the benefit on the one hand is not altogether offset by the detrimental effect on the other. We would not recommend that this scheme be used except on very long lines where trouble has been experienced in reaching the parties near the end of the line.

When the line extends through trees the wires should not touch any of the branches, or even the foliage, as each leaf, especially in damp weather, offers a path through which voice currents leak to ground and are wasted in so far as accomplishing their intended duties are concerned. On a long line in damp weather it will be noted that the transmission is not nearly as good as in dry weather, and this is caused to a certain extent by a very small amount of current leaking by each insulator and any foliage that may touch the wire aids in this diffusion of the talking current.

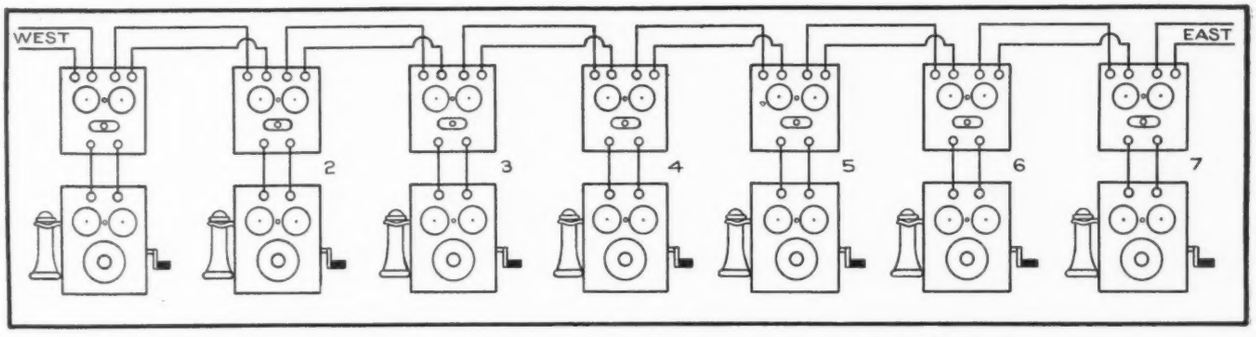


Fig. 1. Conventional Diagram of Toll Line Carrying Seven Bridged Stations.

One method of improving this rural toll service, and avoiding to some extent the conditions just outlined, is to cut off that portion of the line which is not actually required in completing a connection. Thus, for example, in Fig. 1 suppose a party at station No. 4 desires to converse with station No. 7, it will be readily conceded that that portion of the line containing stations Nos. 1, 2 and 3 could be disconnected from the main line to the betterment of the service. This would not only improve the transmission but would also reduce the probability of the conversation being interrupted by any one of the first three parties cutting in on the wire, and what is more, any two of these first three parties could maintain an entirely distinct and separate conversation on their end of the line.

There are several methods of accomplishing the above

mentioned results, and of these the one that is undoubtedly the most widely known is the method of employing a "cut-in station," or "Waterloo equipment," as it is sometimes known. The name "Waterloo" being derived from a town of that name in the state of Iowa where this type of equipment

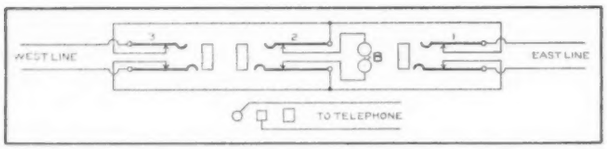


Fig. 2. Toll Line Carried Through Three Jacks, with Attendant's Telephone Wired to Plug; Bell Remains Connected to Side of Line Which is Not in Use.

was first used. This equipment consists of a box about the size of an ordinary extension bell box and is most commonly equipped with three jacks, a bell and a cord and plug. A diagram of the circuit for this scheme is depicted in Fig. 2, from which it will be observed that normally the line is connected through, with the bell *B* bridged across the line. The operation of the circuit is as follows: When the station receives the proper code of rings the party will insert the plug into jack No. 2 and upon ascertaining from which direction the call is coming, he will remove the plug from the middle jack and insert it into jack No. 3 if the call originates in the "west," or into jack No. 1 if the call comes from the "east." It will be noted that upon withdrawing the plug from jack No. 2 the bell *B* is again bridged across the circuit, and that it is cut off from the east or west end of the line whenever the plug is inserted into jack No. 1 or No. 3 respectively. As a result of this condition, it will be observed that in case the attendant has plugged into jack No. 3 and is conversing with a "west line" subscriber, the "east line" subscriber can readily call this station, due to the fact that the bell *B* is bridged across the circuit, and the "west line" circuit is entirely independent of the "east line" circuit due to the cutoff contacts in jack No. 3.

Another method of reaching the same end is shown in Fig. 3. In this scheme, as is shown in the diagram, a two-way key is employed in place of the cord, plug and jacks used in the previously described method. The advantages cited for this second method are the elimination of plug and cord troubles, and the superiority of a key contact to a jack and plug contact. The operation of this circuit consists in throwing the key in one direction to connect to the "west line," and in the opposite direction to connect to the "east line," the bell remaining bridged across the idle portion of the circuit. It will be noted that this circuit has no arrangement by means of which the attendant's telephone can be bridged across the through line, and this constitutes the principal disadvantage of the scheme, for in answering a call he is as likely to bridge his set across the wrong as the right end of the circuit. For calls originating at the cut-in

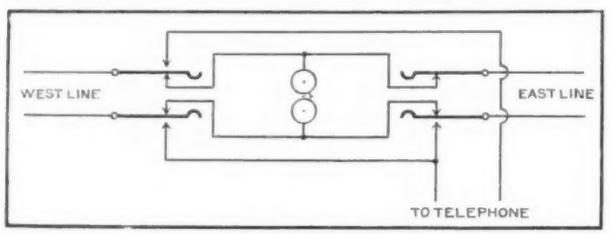


Fig. 3. Wiring of Two-way Toll Cut-in Station.

station it is necessary to open the line to connect the attendant's telephone to the circuit, and this would seriously interfere with any conversation which might be passing over the line. These disadvantages can be avoided by reversing the position of the bell and attendant's telephone, as shown in Fig. 4, in which case the bell in the telephone set is used in calling the station.

The attendant at a station wired in accordance with this scheme has merely to remove his receiver from the hook to answer a call, which is the least amount of work that can be demanded by any subscriber getting the very best city service from the most modern equipment. In addition to this the attendant will operate his cut-off key, as soon as he ascertains from which direction the call is originated, thereby disconnecting that portion of the line not in use. This circuit undoubtedly shows the ideal arrangement of this type of equipment.

The arrangements thus far described are all designed for metallic service, but since quite a number of the lines through rural districts are operated on a grounded return system we have shown in Fig. 5 a circuit used in this connection which is a modification of the one shown in Fig. 4; the operation being identical to that given in the preceding paragraph.

In this connection we wish to show the general method

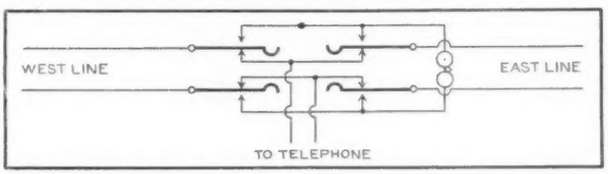


Fig. 4. Improved Method of Wiring Two-way Key at Cut-in Station.

used in connecting a ground line extension, or branch line, to a regular metallic toll line, which operation necessitates the use of a repeating coil. The circuit used for this scheme is presented in Fig. 6. The use of a repeating coil becomes necessary in this connection, due to the fact that it is impossible to connect a grounded line direct to a metallic line and still preserve the advantages inherent in a metallic line. For if the grounded line was connected direct to one side of the metallic line, then it is evident that the other side of the metallic line must be grounded to complete the circuit through the grounded instrument. Consequently the metallic circuit would be practically transformed into a

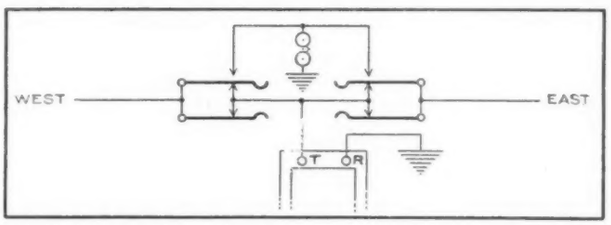


Fig. 5. Wiring of Cut-in Station on Grounded Line, Using Key.

grounded circuit for its entire length, and would therefore be susceptible to all earth currents and other disturbing features common to grounded lines. However, with the aid of the repeating coil high grade transmission can be obtained on the metallic portion of the line, and the disturbing feature of the grounded end will be confined strictly to that section of the line. This is true since the circuits are connected inductively, and not physically, and therefore the metallic end will remain in a well balanced condition, as the ground connections are confined by the repeating coil to the grounded portion of the line. The coil shown in this connection must be of the ring-through type, thus permitting the parties on the grounded line to ring through on the metallic line and vice versa. The key arrangement in this circuit is the same as shown in Fig. 4.

In this connection a few words of explanation in regard to the general construction of the two general types of re-

peating coils will not be amiss. The repeating coil is based on the same principles as a transformer, which, in fact, it is. To obtain an efficient transformer for heavy electrical currents the designer must know the frequency and the voltage of the primary current, and, moreover, he must know the voltage and maximum current that will be taken

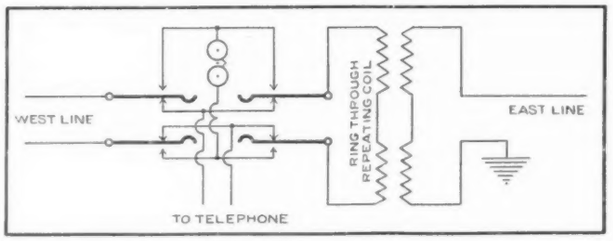


Fig. 6. Junction of Grounded and Metallic Lines at Cut-in Station.

from the secondary side. In power work these quantities are all definite, consequently the designer has a problem with few variables and is, therefore, able to design a very efficient transformer. But on the other hand the quantities in telephonic currents are so varied that it is a much greater undertaking to design an efficient transformer or repeating coil for telephonic purposes. The frequencies of voice currents have a range of many thousands of cycles per second, but even so the frequencies are so high that they can be considered as in one class and a coil can be designed which should have a small amount of iron, that will repeat them with an efficiency of 90 per cent or slightly more. Such a coil is used for talking currents only as no consideration has been given to the lower frequency ringing currents.

A coil designed for "ringing-through" as well as "talking-through" efficiency must cover a much wider range, as the ordinary ringing frequency is less than a hundred cycles while the frequency of waves corresponding to vocal overtones may reach several thousand cycles per second. The coil must be so designed that it will transmit the ringing current efficiency enough to operate the bells satisfactorily, and at the same time the voice currents must be repeated in sufficient quantity to make talking easy. The coil designed for this double purpose must have a large amount of iron in its core, to be able to repeat the ringing current, and the iron must be very soft so as not to retain any of the magnetism in order to properly repeat the voice currents. Such a coil at the best is more or less of a compromise. If a coil for this purpose is constructed with a talking efficiency of about 75 per cent its design may be considered good.

If the junction of the grounded line with the metallic line is not at a point where a telephone is desired the con-

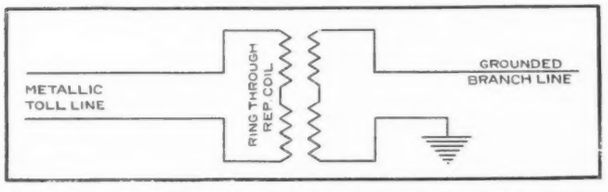


Fig. 7. Junction of Metallic Toll Line and Grounded Branch Line, Where Attendant's Station is Not Required.

nection can be made through a repeating coil, as shown in the diagram in Fig. 7. At points where repeating coils are used especial care should be exercised in obtaining good lightning protection, or a great amount of trouble will arise due to the burning out of the coils.

(To be continued.)

Good Time at California Association Meeting.

Enthusiasm was on tap Saturday, Sept. 26, in Southern California, especially in the section covered by the California Independent Telephone Association. The invitation of the Vita Manufacturing Company, of Los Angeles, to be the hosts was accepted heartily and about 65 persons were aboard when the private car of the Hotel Virginia pulled out of the Pacific Electric depot in Los Angeles at 1:30 p. m. And the ladies. It was the first time they were taken along—and here is a pointer to other associations—don't neglect the ladies. If you think they are not interested, forget it. They are, at least those present Saturday were.

Aboard a fast car with a clear track ahead, little time was lost in reaching Huntington Beach, about 35 miles away. The program named Balboa Beach as the first stop, but as it was about 15 miles farther down the coast a vote showed the members in favor of spending more time in Long Beach, so Balboa was cut off the list.

A few minutes at Huntington Beach was enough, and, shortly after, Naples was reached. Here gondolas and power launches were waiting. Every one enjoyed the half hour ride along the canals except one; she had evidently been seasick before, so preferred to stay on dry land. Another half hour's ride landed the party at the Craig Shipbuilding Works in Long Beach. To those who are accustomed to manipulating the delicate equipment of switchboards and telephones, the large cranes, lathes, etc., were novel sights.

Down the "Pike" was next in order. Here was spent an hour of fun visiting the places of amusement, etc. At six o'clock the business session was called to order with Vice-president Parker, of Pomona, in the chair, Mr. A. Wright, the president, being in the East.

The Santa Monica Bay Home Telephone Company was admitted to membership and the dues to the International Association ordered paid.

A general discussion of collections and contracts ensued but no definite action was decided upon, both matters being held over until the next meeting. A plan whereby all companies will attempt to aid in the collection of accounts from "floaters" was discussed and also laid over for the present. Some inquiries were made regarding liability insurance and the reports from those companies who now carry this form of protection so impressed the members that the unanimous opinion was that each company should take out a policy.

After the meeting everyone enjoyed the banquet and listened to speeches by Messrs. Parker, of Pomona; Collins, of Covina; Frew, of Compton, and Secretary Wardman. Mr. Parker spoke of the recent decision in the United States court covering the case of Pomona vs. the Pacific Telephone & Telegraph Company. Many of the delegates expressed their jubilation over the decision, and a letter of congratulation was ordered sent to City Attorney Loucks, of Pomona. He was the prime mover in the fight.

The next meeting will be at Pomona.

The United States Telephone Company Wins Suit Against the Middlepoint Home Telephone Company in Ohio.

In the suit of the United States Telephone Company vs. the Middlepoint Home Telephone Company, in the Court of Common Pleas of Van Wert County, Ohio, Justice Matthias has just rendered a decision overruling the motion of the defendants to dissolve the temporary injunction issued to restrain the defendant from a continued violation of the terms of its contract with the United States Telephone Company, by reason of which violation toll business was being diverted, and would continue to be diverted to the lines of the Bell system. Extended abstracts from the opinion of Justice Matthias will be published in next week's issue of TELEPHONY.

Comments on the 1907 Report of the A. T. & T. Co.*

By Gansey R. Johnston

General Manager, The Columbus Citizens Telephone Company.

The question at issue, not only academically between the companies, but practically at times between the companies and the public or its legislative bodies, is whether the Independent movement, that is, telephone competition, is a fallacy, or the Bell monopolistic acts and purposes are fallacious.

The directors of the Citizens Telephone Company, like the directors of many other Independent telephone companies, started into the business without experience and with little more knowledge than came from observation. They conceived the business to be an undeveloped one and by no means a necessary monopoly. They purchased their equipment in the open market. They sought to install the best that could be had. They ran the risk of failure in a comparatively untried field. They demonstrated that, with substantially the same form of equipment, a plant of more than three times the size of the Bell plant at the time of their starting could be operated and maintained at not much more than half the long-established Bell rates.

Bell Expenditures to Poor Purpose.

If the Bell company has not been equally successful, it has not been by reason of the competition taking away its business. Its business has grown in Columbus at about the same pace as the Citizens business. Its relative failure cannot be accounted for by me authoritatively or illustrated mathematically; but from observations and from commom knowledge, it may be said that the Central Union Company has had two heavy sources of drain upon its revenue which the Independent companies have not. It has been obliged to pay tribute to the American Telephone & Telegraph Company for license to do business and to use telephone instruments, and has been obliged to buy some of the most expensive of its instruments and equipment from the Western Electric Company, controlled by the A. T. & T. Company, without the benefit of competitive prices.[1] It has ever been trying to re-establish monopoly in the business, and in so doing has cut deeply into its revenues by discrimination in rates, by furnishing free service, by continuing telephones in service after the cessation of payments, by taking on subscribers of known inability to pay, and in other ways making a show of numbers beyond the productive subscription list.[2] It has also, on occasion, made purchases at high prices of competing plants in the vain expectation of stopping competition. It has started the construction of plants and the soliciting of subscriptions at low rates rather with the idea of scaring Independent companies out of business than of completing the construction of a truly competitive service. It has an organized department endeavoring, by threat and persuasion, to break down the continuity of Independent exchanges and toll lines by monopolizing strategic points. It has spent much money in the publication of articles and advertisements and in the circulation of papers and pamphlets designed to influence the public mind toward monopoly and to excite prejudice against its competitors.[3]

Is It Too Late To Mend?

If it be inquired what the Central Union Company may do to restore its shattered finances, the answer may be found, I judge, in the sentence that if that company and its controlling organization, the American Telephone & Telegraph Company, will recognize that the telephone business is competitive and will turn into the channels of inventional and commercial development the money diverted to centralized profits and the endeavor to re-establish monopoly, then every portion of the Bell system may show both profits and progress.

Account Should Be Taken of the Smaller Users.

In the quotation from the A. T. & T. report appears this sentence: "If there are two systems, neither of them serving all, important users must be connected with both systems." Then the argument proceeds as though there is no distinction between important users and all users. It is true that if there are two systems of importance in a community, then important users must or should be connected with both.[4]

It is also true that such important users are getting their double telephone service very cheaply. The less important users, who number five times the duplicate users, get their service (which, so far as students of the telephone demand in Columbus can tell, is satisfactory and of all but complete value), more cheaply than if the community were served by a single system.

Division Means Saving.

To quote again: "Two exchange systems in the same community, each serving the same members, cannot be conceived of as a permanency, nor can the service in either be furnished at any material reduction because of the competition, if return on the investment and proper maintenance are taken into account. Duplication of plant is a waste to the investor. Duplication of charges is a waste to the user." The proper answer to the statement that service on either of two systems cannot be furnished at any material reduction because of competition, is simple denial. This is true as relating to the very small communities, and it may possibly be true as relating to such an extraordinariiy large community as New York in the present state of the art, but for all the cities between the extremes, wherever the business is conducted efficiently and honestly, with

*Abstract from a pamphlet published by the International Independent Telephone Association, continued from issue of October 10, 1908.

[1]The Western Electric Company, late in 1907, presumably under stress of competition, changed its selling plan so as to go into the competitive market with low prices. This may be with the expectation, by unprofitable underselling temporarily, of starving out the manufacturing competition.

[2]The general Bell policy in these particulars also appears to have been modified.

[3]It seems proper to comment that these criticisms of the Central Union Company, applicable to other Bell subsidiary companies, as well as to the parent A. T. & T. Company, are on a somewhat different footing than Bell criticism of Independent motives and actions. The Bell interests have an official control and official policies. The Independent companies, on the other hand, are very largely local and self-governing. They have certain common ties but no common control. We should not pretend that all the actions of all their representatives have been admirable; but to make criticism of any unworthy actions apply to the Independent interests generally, it is needful to show that they have been adopted or approved generally.

[4]When a merchant complains that the growth of a second telephone system forces him to subscribe for a second telephone, it is very much the same as though he should complain that the gathering of a crowd in front of his store every morning forces the opening of its doors and the employment of salespeople to receive the customers.

a fair degree of development, service is cheaper on either of two systems than it would be on a single system of the size of both. Reasons for this are illustrated above as being inherent in the present nature of the business, as well as explained to some extent below. It is independent of the price-reducing effects of competition. It can be illustrated by public argument of the Bell company's representatives, if not deduced from the very report we are commenting upon.

It may be catching up careless wording, or it may be pointing out a saving phrase, to observe that the statement is that competitive service cannot be furnished at any *material* reduction. Whenever the public can get the results of competition upon human action with *any* reduction in the *necessary* costs it is making a two-way saving.

The Future Unpredictable.

It may be that two exchange systems in the same community, each serving the same members, cannot be conceived of as a permanency. It is a condition that has never actually been approached. The permanent condition of the telephone business is not yet to be conceived. The possibilities in different directions appear too great to permit any forecast of its ultimate condition.

The Smallness of Duplicate Charges.

As for the waste in the duplication of charges: In Columbus something like 15 per cent of the telephones are duplicated. The bulk of these duplications are business telephones. Many of these duplicate users would have two or more telephones if there were but one system. Many others get benefits from their telephone service so far beyond its cost that the cost is in no sense a burden or a waste. The cost of a business telephone on the one plant is 11 cents a day, and on the other 15. If incoming or outgoing calls are worth on an average 5 cents apiece, then three a day will pay for the assumed wasteful duplicate charge.

The User Benefited by Development.

From the A. T. & T. report, is quoted: "The cost and value of the system to any subscriber do not depend so much on the number of communications had as on the number and extent of other circuits and facilities necessary to give the communications desired." If it be admitted that competition has been a moving cause in the multiplication and extension of circuits and facilities, then this points to an increase in the value of the systems from competition. Further remarks in the A. T. & T. report are to the effect that the cost or value cannot be exactly distributed. In this may be found a justification for the double charge for the residuum of duplicate users who do not get their share of value from the two systems. Their charges are among those inequitably distributed. In number and in amount of payments, however, they are of very much less importance than those who get their satisfactory restricted service on the single system at the low rate which the division of systems permits.

Are There Double Operating and Maintenance Expenses?

The operating expenses of a telephone exchange, such as the Bell's, are in small part organization and indirect labor costs, and in large part direct labor wages. The former, on the average, are increased by division—whether into separate systems or separate exchanges on the same system. The latter increase and diminish with the traffic on separate systems; but increase always with increased traffic on separate exchanges, with free interchange of calls, on the same system. There are two units affecting operation—the line unit and the call unit. As the number of lines increases on a single switchboard, a point is reached where the line connections cannot be brought within an arm's length. The board must then be divided, and the calls "trunked" or transferred between the boards. This means almost double operating labor on such calls. The call unit is a single call—which is not at all comparable, for instance, with such a unit as a car-mile, since the car may carry, with the same crew, two passengers or two hundred. Does the number of calls double because of competition? On the contrary, an increase would come in both effective and ineffective calls from combination, particularly at the period of the peak-load. I have probably carried this analysis far enough to leave it with the statement that, with minor exceptions, operating expenses are lessened rather than doubled by telephone competition.

As to maintenance expenses, it may be said that the relatively small organization and indirect labor costs may be somewhat increased by separation, and the direct labor wages sometimes also. The maintenance arising from traffic is smaller from competition; so, too, is that from separation of exchanges on the same system. As we shall see, there is not much extra plant cost from the separation of systems; but such as there is entails extra maintenance expenses. To speak of double maintenance, however, is to give no heed to the conditions of the telephone business. The effect of competition in leading the management to the study of economy may be suggested.

The Smallness of Plant Duplication.

Concerning the investment waste from duplication of plant: If the duplication of telephones is 15 per cent, the investment duplication is hardly as much as twenty. The most expensive elements of a telephone plant are individual for each subscriber. The largest single investment item is cable and wire. Only the cable supports and, in part, the sheath are duplicated, and these only in the smaller sizes. The cable and line cost in a well-filled plant is not duplicated even in proportion to the duplicate telephones, because the duplications are mostly in the business districts nearest the exchange, where the cable units, by reason of short lengths and the most economical sizes, are cheapest, and where there may be very little use of line wires, and because the telephone duplications are not all on parallel lines.

Switchboards, if not connected, are cheaper separated than combined. If connected, then, if common battery it is said to be standard Bell practice, in the interest of economy, to separate them when they reach 9,600 lines; and if magneto, their separation means little extra cost. On the whole, it is doubtful whether switchboard costs are duplicated beyond the proportion of line duplications, if as much.

Two pole lines may represent waste when they are parallel with no more of a load than could be borne on one. They may have no element of waste with a greater load, or when shared with other wire-using companies.

On the streets and alleys of Columbus are poles conveying wires of the following companies: The local Bell company, the long-distance Bell company; the local Independent company, the long-distance Independent company; the Western Union Telegraph Company, the Postal Telegraph Company, the American District Telegraph Company; the Columbus Railway & Light Company; the Columbus Public Service Company, with electric lighting and power circuits; the municipal light plant, the municipal fire-alarm and police telegraph system; and sundry electric traction companies. The long-distance telephone circuits of both companies are carried within the city almost entirely upon the poles of the local telephone companies. It is worthy of mention that the long-distance Bell company, which controls the local Bell company, has, outside the city, chosen to parallel local Bell pole lines in order, apparently, to reserve pole space for future circuits; and that Central Union pole lines in places parallel Central Union subway. The telegraph companies have several joint arrangements with one telephone company or the other for important

pole lines through the city. The Citizens Telephone Company has a working arrangement with the municipal lighting plant for joint occupancy of poles in a large section of the city, and with the Railway & Light Company for joint occupancy of poles throughout the entire city. The Railway & Light Company has a joint pole line with the Postal Telegraph Company. The Bell company and the Public Service Company exchange pole contracts. The fire-alarm and police and the district telegraph circuits are almost together on others' poles. There are other minor arrangements between these different companies as, for example, with the electric railway companies. All of these arrangements go to reduce the number of poles in the city. It is a question whether, if the Bell and Citizens local telephone service should be combined, there would be any reduction in the number of poles required for the public utility companies.

At present prices two 35-ft. pole lines cost no more than one 50-ft. line.

Increasing the load may require larger poles and more expensive guying and assist deterioration. Poles, which have probably been used more in the past than they will be in the future, are increasing in price, particularly those longer and heavier poles that a combined system would require.

Of the subway and conduit system only that smaller portion is waste which is represented by the costs of opening and repaving the streets, the manholes, and part of the digging, and perhaps by ducts carrying duplicate cable. Subways and manholes cannot always be combined economically, particularly when the system is of large size or in streets with many obstructions. Subway material, which will probably be used more in the future than in the past, has been decreasing in price.

The cost of interior wiring and instruments is duplicated only in proportion to the duplication of telephones. This duplication gives the users the benefits of simultaneous and alternative use.

The buildings may well be duplicated without waste, particularly as modern construction favors plenty of space, light and air.

All the engineering and overhead expenses are relatively small and probably contain little unnecessary duplication.

(To be continued.)

Practical Questions and Answers

Noise on Common Return Lines.

We have a common return system with the return wires not grounded. One of our telephones, *A* in Fig. 1, was connected to a line wire in the lead in the street, running in front of a house. The return wire was connected to the common return, in the alley back of the house. The electric light line is across the street east. The telephone was very noisy until we changed the

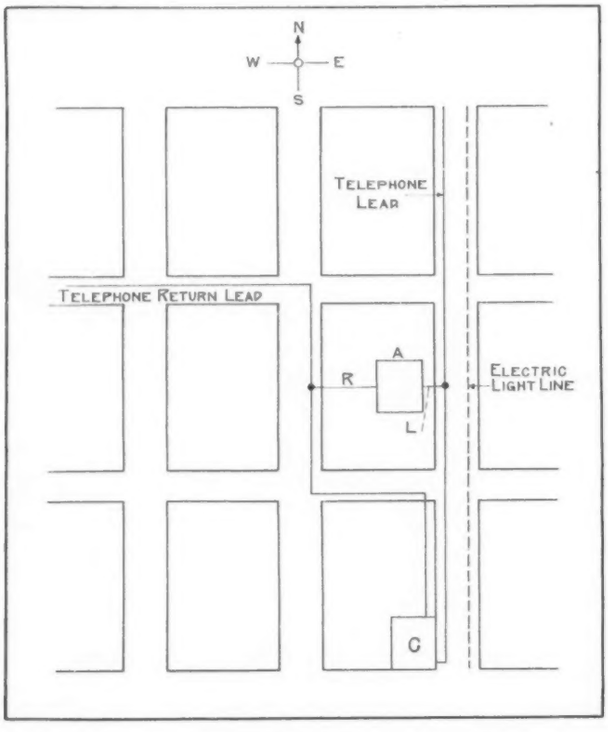


Fig. 1.

return wire from the alley return to the street return. The central office is at *C*. Why did the change make any difference? Both returns were connected together at the office.

Referring to the sketch (Fig. 1), it will be noticed that the street lead and its return (not shown) parallel the electric line for considerable distance. The lead in the alley is more removed from its influence. One of the conditions of quiet in a telephone line exposed to foreign influences is that both sides of the circuit shall be equally effected by the disturbing force. Consequently, if the line wire to the telephone is near the electric light lead, and the return wire to which it is connected is very much farther away, an unbalanced condition results, producing noise. By the change which you made the condition of equal exposure was approximated, and that line was probably made no more noisy than the other lines.

Electrolytic Rectifier.

Please publish in your columns a formula for making an acid rectifier, with a capacity of about four amperes.

The electrolytic rectifier consists essentially of a plate of aluminum and a plate of lead or carbon immersed in a solution of some salt or acid. Lead is preferred for the plate to go with the aluminum, and a solution of phosphoric acid for the solution. While in operation the cell gets hot unless the current density on the plates is kept low, or means are used to cool the cell artificially.

For a four ampere cell make the aluminum plate about 4 ins. long by 1½ ins. wide, giving 6 sq. ins. surface on each side. Make two lead plates, each of the same size as the aluminum plate. Arrange the three plates in a glass jar with the aluminum plate between the other two, with ⅜ to ½-in. space between plates. Wire the two lead plates together so that they will act as one terminal. When the elements have been assembled they may be put in as small a glass jar as will contain them. Make up a 45 per cent solution of phosphoric acid by adding water to the acid as purchased from a drug company; it usually comes in a thick, syrupy liquid form, at 85 per cent.

Make up four such cells. They must be "formed" before they are ready for rectifying. To do this, connect them in series as you would connect dry cells or any other battery, connecting the aluminum pole of one cell to the lead of the next. Then connect them to a source of direct current, with the current entering at the aluminum terminal, and leave them thus for an hour or more. If you insert an ammeter you will notice that the current is high at first. Limit it with resistance so that it will not exceed two or three amperes. As the plates become formed you will notice the current falling off until but

a fraction of the original current is left. The plates will form or alternating current, but not as quickly as on direct.

When formed, arrange them in the circuit shown in Fig. 2. Connect the two upper cells aluminum to aluminum, and the

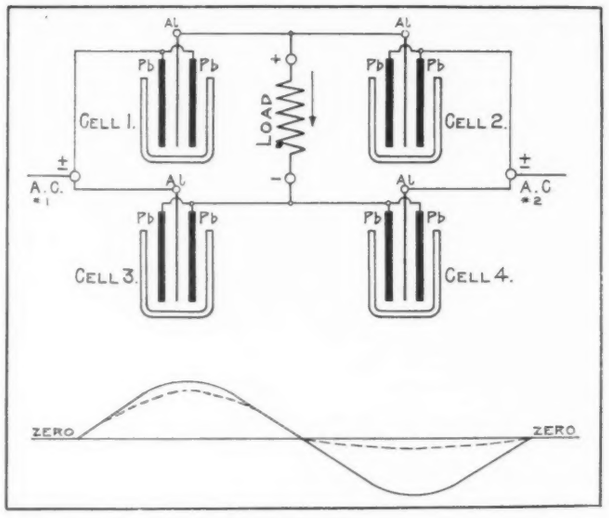


Fig. 2.

two lower cells lead to lead. The remaining terminals are to be connected to the line terminals, as shown in the sketch. The load through which the direct current is to flow is indicated, being connected to the inside of the square thus formed. The positive (+) terminal is between the aluminum plates above and the negative (—) between the lead terminals below.

The rectifying action of the cell is as follows: When current flows through *from lead to aluminum* it meets with little opposition. When it flows in the reverse direction, from *aluminum to lead*, it meets with very high resistance, practically wiping out that half of the wave. This produces the condition represented in the curves, where the solid line is the current which would flow if no cell were present. The dotted line shows approximately what occurs, due to the cell wiping out nearly all of the reverse flow below the zero line. Referring to the circuit we can see how both parts of the cycle are rectified. When current is flowing from the left, entering at terminal No. 1, it will try to enter both cells No. 1 and 3. In cell 3 it meets the aluminum plate first, which keeps it out. In cell 1 it enters by the lead plates, which allow an easy path. Leaving by the aluminum plate the current tries to flow again by two paths. It cannot get out by way of cell 2, for again it meets aluminum first. So it is forced to go through the load to cell 4, where it easily escapes by going through from lead to aluminum. In the same way the reverse current, from the right, is made to flow from terminal No. 2 through cell 2, load, cell 3, and out at terminal No. 1. This makes both parts of the alternating current wave pass in the same direction through the load.

The electrolytic rectifier shows a tendency to warm up in action. If it warms too much you may find it necessary to immerse the glass jars in cold water. All four may be placed in one bath, if the jars are deep enough to allow them to project above the surface a safe distance, so that no water can splash in, nor perceptible leakage occur from cell to cell. Do not be alarmed if the electrolyte in the cells bubbles and gets white. This is part of the normal action. As the level is lowered by evaporation, add pure water.

If the rectifier stands idle for some time, it loses part of its rectifying power, so that when you first turn on the current there will be great leakage. But this will not last long, for it soon picks up the "valve" action.

The Telephone in the Courts

Conducted by A. H. McMillan

Contact Between Telephone and Electric Wires.

About nine years ago our company obtained a franchise and constructed a telephone exchange in this village. A few years afterward an electric railway company obtained a franchise to construct an electric railway through the village. After our poles had been erected along a certain alley and wires were run from the main line to subscribers' residences, the railway company placed its high tension wires on the opposite side of the alley and across our lines running to the subscribers' residences, so that in July of this year the railway company's high tension wires were blown against one of the wires running to a subscriber's residence and as a result considerable cable was destroyed and our switchboard damaged. Can you cite us to any cases decided by the courts wherein such a proposition has come before them for decision? We think we ought to recover from the railway company for the damage we sustained.

You are certainly, under the facts set out in your letter, entitled to recover from the railway company for the damage you sustained. Proper and safe construction is held to require the placing of guard wires at not less than four feet above the lower electric wires, serious consequences being prevented in this manner by the guard wires restraining and safely carrying off the high tension currents. In fact, the duty of the traction company, coming later into the field, is to protect the previously established telephone wires from damage by contact. This duty places upon the company the burden of using reasonable care and prudence in placing its wires and poles and of adopting all ordinary and usual appliances and methods to prevent contact. For the failure to place guard wires in this way, the traction company is liable in damages, may be restrained by injunction from operating its lines without such guard wires, or may be compelled by mandamus to establish them. State vs. Janesville St. Railway Co., 87 Wis. 72; 41 Asr. 23; 4 Am. Elec. Cases 289; McMillan on Telephone Law, sec. 140.

Liability for Negligence of Operators.

In Hunt county, Texas, J. R. Wiggs and wife sued the Southwestern Telegraph and Telephone Company to recover damages for the suffering occasioned Mrs. Wiggs (not of the "Cabbage Patch") by the alleged negligence of its employees in failing to notify her of a call from her father that he might talk to her over the telephone of the condition of her brother who was dying at Greenville. The trial was had, resulting in a verdict in favor of the telephone company. There was evidence introduced that when the father was informed that no message could be delivered before 7:30 a. m. unless a special messenger charge was paid, he stated that he would call again at 8:30. The evidence was conflicting on this point as well as on the question of whether the father offered to pay the messenger's fee and whether, if plaintiff had talked at 8:30, she could have reached her brother's bedside before his death. The court charged the jury that if the father agreed to talk at 8:30 and, had the plaintiff talked at that time, she could not and would not have been able to have reached her brother's bedside before he died, then she could not recover whether the company was negligent or not.

The case was appealed to the court of Civil Appeals of Texas which held that this instruction was proper and

affirmed the judgment for the telephone company. Wiggs vs. Southwestern Teleg. and Telep. Co. 110 S. W. 179.

Compelling a Telephone Company to Exercise Its Franchise.

The city of Hickman, Ky., brought action against the Cumberland Telephone & Telegraph Company to enjoin it from doing business in the city, or from charging higher rates than fixed in its franchise. The constitution of Kentucky (Sec. 164) requires a municipality before granting a franchise, to advertise for bids therefor and to award it to the highest and best bidders. The statute of Kentucky (Ky. St., 1903, Sec. 3636) prohibits the adoption of a franchise ordinance on the date of its introduction or within five days thereafter or except at a regular meeting. On August 16, 1894, the city council directed an advertisement to be published for bids to be received Sept. 3, the next regular meeting, and an ordinance detailing the privilege to be granted and the term was introduced and laid over to the regular meeting. On Sept. 3 a bid was accepted and the ordinance adopted.

A dispute as to rates having arisen between the company and city, the latter, in a suit to enjoin the company from doing business in the city, contended that the franchise was void because passed on the day of its introduction, and the same day the franchise was sold. The Court of Appeals of Kentucky, however, held that the franchise was granted in strict conformity to the constitution and the statute, and was not void.

The franchise originally granted had lapsed on account of the failure of the company to commence work within the time specified therein, but an ordinance has been passed waiving the forfeiture and extending the time for commencing work in consideration of a reduction of rates to subscribers. The city contended that this ordinance was void and unconstitutional for the same reasons that the original ordinance was void, but the court upheld it.

The reduction of rates provided for in the latter ordinance fixed the maximum limit to subscribers at not to exceed $1.50 a month for residences and $2.50 a month for business houses. These rates were maintained by the company for some time, but finally increased above the maximum provided. The company, when the bill of complaint was filed to enjoin the company from charging more than the rates fixed in the ordinance, failed to answer, and allowed judgment to be taken against it by default, and an injunction was granted. The company then closed its exchange and attempted to abandon its franchise. The city and citizens then brought another suit to enjoin the company from discontinuing its service, and in this suit the court made an order granting the injunction asked for. The granting of this injunction was held by the Court of Appeals to be proper. In construing the franchise, the court held that the rates fixed did not entitle subscribers to service to other towns and cities specified in the ordinance without additional charge, but merely gave them the privilege of using long distance connection from their telephones.

Cumberland Telegraph & Telephone Co. vs. Hickman, 111 S. W., 311.

Damages for Violation of Contract by Subscriber.

At Alton, Ill., the Kinloch Telephone Company has recovered judgment against Samuel Wade, Agent for the Alton bank, for $8.75 for telephone rental, on the ground that there was a violation of the contract on the part of the defendant. The testimony showed that Mr. Wade signed a five-year contract in 1906, with the privilege of quitting after the first year if the bank did not need the telephone. At the end of the first year Mr. Wade had the telephone taken out, but still continued doing business in East Alton, having substituted a Star Line Telephone for the Kinloch. The Kinloch people felt that this was a violation of the contract because Mr. Wade was still doing business at the bank, and the court upheld this contention.

Telephone News

Equipment Installation for San Francisco Home Telephone Company to Begin Next Month.

As was brought out in the recent hearings before the Board of Supervisors, the Home Telephone Company has already invested in San Francisco nearly $3,000,000 in its plant. This sum includes the cost of an extensive conduit system covering not only the present fire limits of San Francisco, but also what will be the fire limits of the city 25 years hence; beyond these limits a modern overhead system is being installed. Of its buildings, the main exchange and office building is the most elaborate. It is now well along toward completion and architecturally is one of the most handsome structures in the city. It is seven stories and basement of Class "A" construction, and will cost upwards of $250,000. On Howard street, between Fourth and Fifth streets, a three story and basement concrete building has been erected on a lot 50 by 150 feet. A third building is under construction on Bush street beyond Fillmore streets, a fourth will be built at Seventeenth and Albion to serve the Mission district, and a splendid site for a fifth structure is owned on Market and Stevenson streets between Sixth and Seventh streets. A large warehouse is also maintained on the waterfront at Montgomery and Francisco streets. The equipment for the plant is nearly all in San Francisco and the installation will commence early in November. It is the expectation that the company will be able to begin operations early in the spring. The Automatic Electric Company's instruments and system will be used.

In Oakland the Home Telephone Company of Alameda County, a separate but allied corporation, already has four exchanges in operation with 5000 subscribers. The Berkeley exchange is now under construction and the Alameda branch will follow later.

The personnel of the Home Telephone Company of San Francisco is made up largely of San Francisco and Los Angeles capitalists, the officers being as follows: President and attorney, L. S. Beedy; secretary and treasurer, G. B. Ocheltree; attorneys, Thomas, Gerstle, Frick & Beedy; chief engineer, S. G. McMeen of McMeen & Miller, Chicago. Among the Los Angeles capitalists interested are J. S. Torrance, financial manager of the Union Oil Company; J. B. Miller, president of the Edison Electric Company; E. J. Marshall, of the Sinolao Land Company; James H. Adams & Company, bond agents, and J. C. Drake, president of the Los Angeles Trust Company. There seems to be no doubt also as to the truth of recent reports that Henry E. Huntington has become very largely interested in the Home Telephone Company. This is the first investment that Mr. Huntington has made in San Francisco since the time that he left the city seven years ago, declaring that he would never again own any property there. In addition to his extensive suburban trolley interests at Los Angeles, Mr. Huntington has invested in Independent telephone com-

panies in southern California so that this investment is not a move into a new field for him. It is stated that this investment by Mr. Huntington was delayed during the attack on the validity of the Home Telephone Company's franchise granted by the last Board of Supervisors, and that as soon as the opinion on the validity of the franchise was obtained from Dillon & Hubbard, of New York, Mr. Huntington put in his money.

Texas Independent Company Takes Three Important Hotel Branch Exchange Contracts.

At San Antonio, Texas, the San Antonio Telephone Company (Independent) has been awarded contracts for branch exchange service in three important hotels. The competition for these contracts was rather keen, and the management of the San Antonio Telephone Company has made an exceedingly good showing in securing all three of them. The contracts are for five years, with the privilege of renewal for a further term of five years. The San Antonio Telephone Company will immediately take up the work of wiring the buildings and installing switchboards and telephones.

The largest of the three systems will be in the St. Anthony Hotel, which will have 240 telephones or more installed throughout the building. The Hutchins Hotel will have about 40 telephones connected to its branch exchange, and the Menger Hotel will have three booths and 225 telephones installed in the offices and rooms of the hotel. These installations will enable any guest of the hotel to reach any subscriber connected to the large local system, or the extensive group of long distance lines which center in the exchange of the San Antonio Telephone Company.

Iowa Independent Refuses to Deal With Its Competitor.

Since the Tri-State company of Iowa has been absorbed by the Pitcher Telephone Company, as recently announced in TELEPHONY, representatives of the Iowa Telephone Company have been making attempts to induce the Pitcher company to connect with the Bell lines.

According to reports current in Dubuque, the Pitcher directors wanted to be shown where they would gain anything by having toll connections and what the Bell people expected them to do. The Bell representative told them that the Bell expected ultimate surrender on the part of the Pitcher officials and the absolute control of both the Pitcher and the Tri-State lines. The Pitcher people turned down the proposition, saying in effect that they could not afford, at this time, to turn in with the Bell interests for the reason that up to the present the minority stockholders of the Bell company had never received a cent on their investment. They couldn't see where they were going to get anything for their company by turning it over to the local Bell interests, when these interests were not paying a cent of interest on their investment.

Michigan Association Convention, November 17 and 18.

The executive committee of the Michigan Independent Telephone Managers' Association held a meeting in Grand Rapids, Mich., October 8, and decided to hold the semi-annual convention of the Association at Cadillac, November 17 and 18.

The following program was adopted:

Address of Welcome by Hon. E. L. Metheney, Mayor of Cadillac. Response by President Wm. Robinson. Reports and Election of Officers.

"Trouble that Troubles the Wire Chief," by E. D. Barber, Wire Chief, Traverse City.

"Telephone Geography," by W. S. Vivian, Manager Traffic Association.

"Best Methods of Advertising Long Distance Business," by S. E. Fischer, Assistant to General Manager Inter-State Long Distance Telephone Company.

"Co-operation of Manager and Toll Operator," by Miss Ethel Payne, Chief Operator, Owosso.

"Which should have Precedence, Short or Long Haul Long Distance Calls?" by Miss Bessie Preston, Chief Operator, Lansing.

"Absurdity in Routing Long Distance Calls," by G. F. Stratemeyer, Traffic Manager, Grand Rapids.

Question Box—Committee: Miss Bessie Bottomley, Chief Operator, Cadillac, Mich.; Mrs. Florence Gould, Chief Operator, Battle Creek, Mich.; Miss Swaverly, Chief Operator, Kalkaska, Mich.

The routing and handling of toll business was considered and a report will be given at the meeting of the Traffic Committee on October 29.

Since the forming of the Managers' Association some two years or more ago, there has been material improvement in the long distance service of the Michigan Independent telephone companies, largely due to getting the managers, chief operators, inspectors and other employes together from time to time to talk over matters pertaining to the business.

The report of Mr. A. A. Burch, secretary-treasurer, showed the Association to be in a healthy condition. The resignation of Mr. C. B. King, of Ann Arbor, as a member of the executive committee was presented and Mr. C. E. Smith, of Cadillac, appointed to fill the vacancy.

The following members of the committee were present: President, Wm. Robinson, Muskegon; vice-president, H. T. Clough, Owosso; secretary-treasurer, A. A. Burch, Battle Creek; C. E. Smith, Cadillac, and F. V. Newman, Grand Rapids.

Italian Telephone Engineers Visit America.

That America is not only the home of the telephone but also the place where it has attained the most perfect development, is evidenced by the number of times that foreign engineers have come here to study our methods and apparatus. The latest prominent party is from Italy.

Sr. Alberto Faranda, of Rome, chief telephone engineer

Fig. 1.—Ladder Wagon Used in Italy for Clearing Crosses.

of the Italian Department of Telephones, is now on a tour of inspection through the United States. He is accompanied by Sr. Pietro Pistolese, of Naples, one of the telephone engineers who have charge of the government work. Together they inspected the system of the telephone company in New York City, from which place they went to Chicago to visit the exchanges of the Chicago Telephone Company.

While in Chicago they spent some time in the factory of the Automatic Electric Company, where they became much interested in the automatic system. They were invited to see the systems at Columbus, Ohio, and accepted.

On the way they stopped at LaFayette, Ind., to visit the Sterling Electric Company, as they had become acquainted with Mr. Evan Shelby on his trip to Italy last year. From the Sterling factory they were escorted by President W. E. Doolittle, Chief Engineer S. B. Fowler and Mr. Evan Shelby to visit the telephone laboratory of Purdue University. Prof. Arthur Bessey Smith explained the plan and workings of the laboratory, in which Srs. Faranda and Pistolese were very much interested.

From LaFayette they were escorted by Mr. W. E. Cook, of the Automatic Electric Company, to Columbus, Ohio, where they will examine the automatic system in practical operation. It is their intention to sail from New York October 15, returning to Italy.

Previous to June, 1907, the telephone business of Italy was in the hands of numerous syndicates who operated in the various cities. On that date the Italian government purchased all the systems and consolidated them under one control. A new system will be installed in Rome, Venice, Milan, Florence and other principal cities, as well as Palermo, Sicily.

The present population of Italy is about 33,000,000, and the average telephone density is one telephone for every 750 people. Rome, with half a million population, has only 7,000 telephones, Naples with 600,000 people has 3,000

Fig. 2.—Roof of the Rome, Italy, Telephone Exchange.

telephones, while Venice with 300,000 people has only 1,300 telephones. Three toll lines suffice for the business between Rome and Naples. Every toll user must deposit a guarantee of $10.00 before he may use the lines. Its effect in stimulating (?) toll traffic needs no comment. There are no rural lines, as the peasants are too poor to afford telephones. Consequently service is restricted to hotels, merchants, officials, lawyers, doctors, and other professional men. All systems are magneto multiple. The lines are carried through series contacts in the multiple jacks to series drops. The subscriber lines are individual metallic circuits, of galvanized iron wire a little larger than No. 14, Birmingham gage.

Open wire construction prevails, carried over house tops

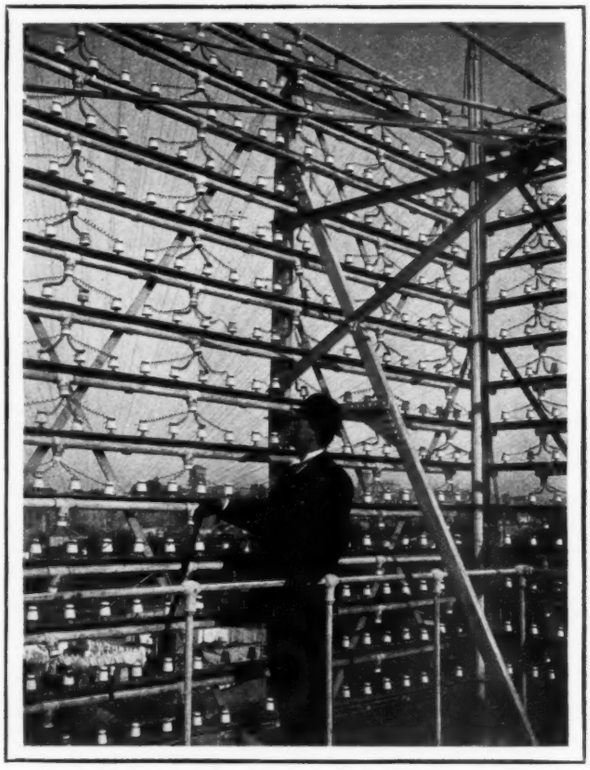


Fig. 3.—Details of Terminal Structure on Roof of Rome Exchange.

on expensive fixtures To clear crosses a ladder wagon, Fig. 1, is used. It is not unlike our fire wagon with the extension ladder. The ladder is about 75 feet long. It is pulled about the streets by six linemen, and it takes about an hour and a half to erect the ladder and take it down again.

The congestion of the open wires at central may be seen from Fig. 2, which shows the roof of the Rome exchange. Fig. 3 shows the details of the terminal structure. The open wires end on porcelain insulators, from which insulated wires run inside iron pipes to the room below. Mr. Shelby, who furnished the photographs, estimates that this roof terminal must have cost not less than $25,000. The small cable seen in Fig. 2 is about 300 feet long, and is the only cable in Rome.

It is the intention of the State to install cables as far as possible and to substitute bronze wire for the iron where open wires are necessary. Common battery systems will replace the magneto, but whether manual or automatic has not yet been decided.

Northeastern Iowa Telephone Men Meet.

The Northeastern Iowa Independent Telephone Association held its semi-annual convention in Waterloo, Iowa, October 15, at the Ellis Hotel. Papers were read on the following subjects:

"Equitable Treatment of Patrons;" "Maintaining an Efficient Service;" "Economy in Collecting and Account-

ing;" "Economy in Other Departments;" "Building a Telephone Business."

The Black Hawk Local Association, consisting of farmers in Black Hawk and adjoining counties, also held its annual meeting in Waterloo on the same day, having a joint meeting with the Northeastern Association.

On Friday, October 16, the semi-annual meeting of the Corn Belt Workers, that is, employes of the Corn Belt Telephone Company of Waterloo, was held. The topics considered were:

"The Most Important Points for the Local Agent;" "The Most Important Points for the Trouble Man;" "The Most Important Points to be Impressed upon the Mind of the Patron;" "The Most Important Points for the Maintenance of Line and Telephone Property Generally;" "The Most Important Divisions of the Service;" "The Most Important Divisions of the Business."

A trolley ride from Waterloo to Cedar Falls and Normal was taken and a luncheon served en route from twelve to three.

There was a large attendance of telephone men at these meetings and much good is expected to result from the joint conventions.

New Step in Nashville Telephone Financing Controversy.

The Cumberland Telephone & Telegraph Company is reported to have filed an amended bill in the chancery court at Nashville, Tenn., in the matter of the controversy arising between that company and the Landis Banking Company and the Southern Telephone Development Company. In the amended bill the Cumberland company asks for an accounting of certain affairs of the Landis Banking Company, on deals relative to Cumberland Telephone & Telegraph Company stock, that the affairs of the Southern Development Company be wound up and its assets distributed under decree of court, and that judgment be given the Cumberland Telephone & Telegraph Company for 4,816 shares of Cumberland Telephone stock against the Landis Banking Company, and the Southern Telephone Development Company. In the bill the language is unmistakably severe. In one particular the bill states that at the time John T. Landis alleges he was given a contract by the Cumberland company to underwrite its stock for 1½ per cent in order to guarantee par to the company, its stock was selling in the open market for $120 and $122, and that if the Cumberland company desired a guarantee of par on its new stock it would seek a bank or trust company that was responsible for its contracts. In this connection the bill alleges that the Landis Banking Company has an outstanding capital stock of only $15,800.

The amended bill gives all the deals of the Landis Banking Company, and the Southern Telephone Development Company, a "side-swipe," alleging that in these many transactions there had been overcharges, undercharges, errors, misstatements, incorrect division of profits on stock, etc., and seeks to have the court review the whole relations of the three interests from the beginning to the present time. It is alleged that between John T. Landis, the Landis Banking Company, and the Southern Telephone & Development Company, there are now wrongfully held 4,816 shares of Cumberland Telephone & Telegraph Company stock on which is due less than $35,000, and that the claims of Landis and the Telephone Development company are unjust.

Mr. Landis will not discuss the matter in detail but states that when the case is called for hearing in a few weeks the world will be given some interesting facts about high financing.

President Caldwell, of the Cumberland company, vigorously affirms that he has never participated in any profits from the operation of the Southern Development Company. In a letter to TELEPHONY, referring to the article published in the issue of September 19, he says:

"Neither myself, nor any of the officials of this company (the Cumberland company) were ever stockholders or officials of the Southern Telephone Development Company, and never participated, nor were they in a position to participate, in any of the profits therefrom."

It is a further item of interest which was not made clear in the previous article, that Mr. Landis is not, nor has he ever been, an official or director in the Cumberland company.

Interest in the situation, and the belief that testimony offered at the hearing will bring out details which will shed a great deal of light upon the dealings of the Cumberland corporation, are not only increasing in Nashville, but are arousing much comment in the telephone field generally.

Telephone Tangle in Salt Lake City Settled.

Definite agreement on the telephone license tax question in Salt Lake City, which had been under dicussion the greater part of the year, was reached on a basis satisfactory to the city and the two telephone companies October 1, when Mayor John S. Bransford signed an amendment to the existing city ordinances which had been passed by the City Council September 29. The amended ordinance makes it optional with the telephone companies to pay one per cent of their gross earnings to the city and to furnish fifty free telephones for municipal use, or to pay the license tax as prescribed.

Both the Utah Independent and the Rocky Mountain Bell Telephone companies have accepted the amendment, which places both companies on the same basis. The action taken puts an end to all discussion as to the constitutionality of the telephone license tax, the question as to the Bell company's franchise, etc., and both sides appear to be thoroughly well satisfied. It is believed the companies will elect to pay the one per cent and furnish the fifty free telephones rather than pay the tax prescribed.

The ordinances fix a license tax of one dollar a year on all telephones renting for more than $60 a year and 50 cents on all telephones renting for less than $60. The Independent company was required to pay one per cent of its gross earnings and to furnish 54 free telephones to the city under its franchise. The Bell company had been furnishing 40 free telephones in lieu of a license tax under a contract with the city.

The new arrangement, under existing conditions, means that the city will get about $6,400 in telephone service and cash from the Bell company each year and about $3,600 from the Independent. The tax, if paid all in cash, would give the city about $2,500 from the Independent company, in addition to the one per cent on its gross revenue, and about $4,000 from the Bell, which was not required by franchise to pay any part of its gross earnings to the city, and the city would have to pay cash for its Bell telephones.

The amended ordinance, which was in the nature of a compromise after several other measures had been suggested and rejected, was passed unanimously by the council.

New Circuits Close Gap Between Indiana and Michigan.

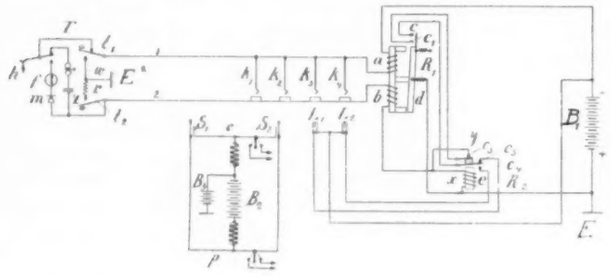
In practically the entire state of Michigan served by Independent telephone systems, first class service to Indiana points may now be had. The final link necessary for this connection has been completed by the construction of one No. 10 copper circuit, and one No. 10 iron circuit between Colon and Cassopolis, Mich. Messages may now be routed through by way of Battle Creek and Colon, or via Grand Rapids. Copper circuits from Colon connect directly with Ft. Wayne, Ind., and those from Cassopolis run through to South Bend, Logansport, and Indianapolis.

Telephone Patents

TELEPHONE EXCHANGE APPARATUS.

E. Tanke, Berlin, Germany, patent 899,850, Sept. 29, 1908.

This patent relates to a telephone system, in which the subscriber has several switches, and can place himself in front of a desired plurality of operators in a given group. Thus if the man he desires to call is in a certain group, he presses the button which brings him in front of an operator who connects subscribers with that particular group. If his call is for a



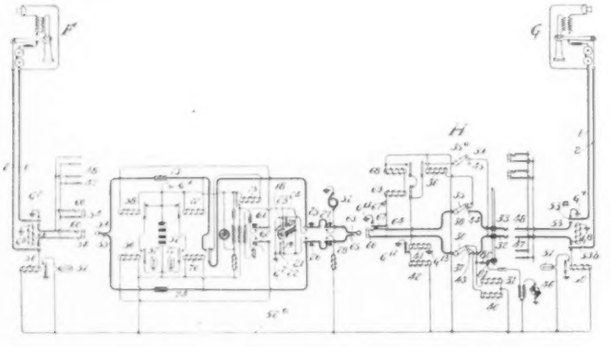
subscriber in a different group, he actuates another button, which brings him in front of another operator. Thus the subscriber at station T can call either one of the line lamps L_1 or L_2, and thus get into the positions occupied by different operators. The number of multiple jacks necessary in the exchange is reduced by this invention.

TELEPHONE SYSTEM.

A. H. Dyson, Chicago, Ill., patent 899,787, Sept. 29, 1908.

This invention consists in having answering jacks provided for the various subscribers' lines in front of each operator, but no multiple jacks. Whenever a subscriber answers a call, the operator inserts a plug in the answering jack of the subscriber, and then uses an automatic switch to connect with any one of the subscribers whose lines enter the exchange. When the subscribers hang up the automatic switching mechanism is automatically restored. No multiple jacks are needed in the switchboard. The calling is done the same as in any other system.

A further application of this invention is shown in the illustration where the system is applied to a trunking system,



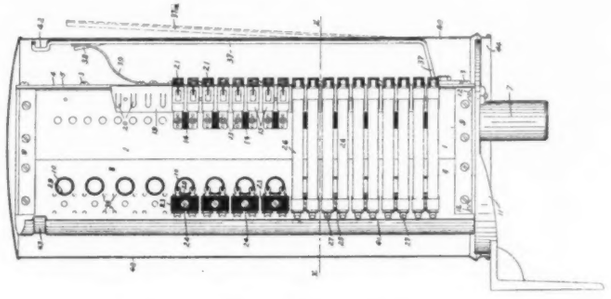
the operator's automatic connecting means serving not only to place calling subscriber in connection with the subscriber entering the exchange, but through suitable trunk mechanism with subscribers which enter any other exchange in the same system, thus requiring no B operator.

CABLE TERMINAL.

F. B. Cook, Chicago, Ill., patent 897,062, Aug. 25, 1908.

This invention relates to cable terminals having an air and moisture tight distributing box for the cable conductors, and fanning strips for the aerial conductors leading to the terminal. The terminal is constructed of sheet metal, and the cover 40 is held by means of a spring 37, 37*a*, which presses outwardly against the cover to hold it in any position, either closed or partly opened. Fanning strips 8-8 are provided, to which the cables are attached.

If it is desired to release the cover to expose the entire

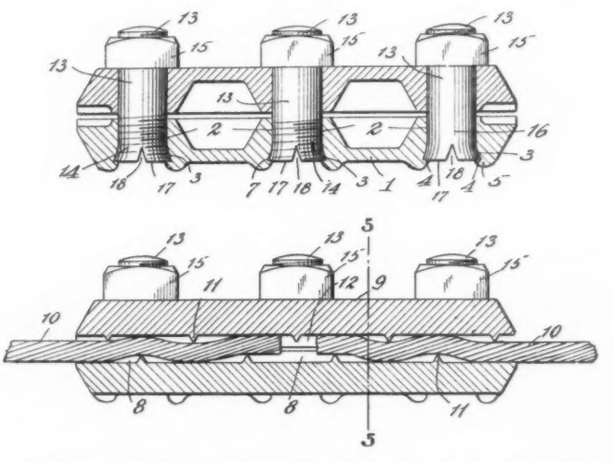


terminal, the cover is elevated until it registers with the notches 42-43, the notch 42 being provided with a ring which then holds the cover in its highest position. An air-tight box 1 is mounted in the cable terminal, to which connects preferably a self soldering nozzle 7. Lightning arresters 21 and fuses 26 are mounted in this box. The terminals 23 connected to the fuses are mounted on the fanning strips 8.

CABLE CLAMP.

H. B. Newhall, Plainfield, N. J., patent 899,757, Sept. 29, 1908.

A cable clamp, principally for holding guy wires, is described in this patent. It consists of a retaining member 1, which is provided with pan shaped slots, two being shown in this instance, for holding guy wires. A corresponding clamping member 9 co-operates with the member 1. The two members are held together by means of bolts 14, which



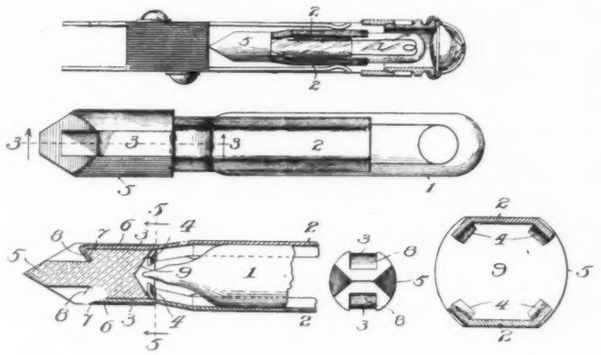
are fastened in outwardly flaring recesses 3, and impinging against lugs 4, and are then split as shown at 18, forcing these bolts into their allotted recesses. In order to more firmly hold the cable, teeth 11 are cast in the members as shown.

SWITCHBOARD SIGNAL LAMP.

E. B. Craft, Wilmette, Ill., patent 899,514, Sept. 29, 1908.

A switchboard signal lamp of the miniature type is to prored by this patent. The object of the invention is to pro-

vide means whereby signal lamps having proper provisions for connecting the contact terminals thereof with filament and avoiding all outstanding or projecting metal parts which might interfere with the insertion or removal of the lamp. The lamp filament is connected by wires to the terminal plates, 2, which terminal plates are extended into tongues 3, bent over at 8 and held in the porcelain base 5.

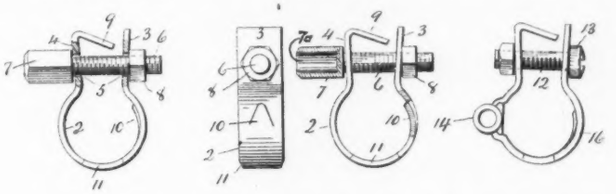


The porcelain base has grooves 6 to accommodate the tongues 3. The plates 2 are provided with lugs 4, which securely hold the porcelain base 5. No projecting parts are therefore required, or indentations of the plates 2, as the projecting lugs hold these porcelain plates.

GROUNDING CLAMP FOR ELECTRIC WIRES.

W. H. Vibber, New London, Conn., patent 899,636, Sept. 29, 1908.

This invention relates to a grounding clamp for electric wires, and is designed to provide a special groove or socket in which the ground wire can be placed and soldered if



necessary. The device consists of a ring 2, having teeth 10, punched therein, which are adapted to make contact with the cable or wire to which the clamp is to be attached. The side ring 2 has projecting arms 3-4 and the projecting arm 4 is bent inwardly to form a yielding stop finger for the clamp. A screw 6 having a hollow head 7 passes through the arms 3 and 4, and is screwed up tight by means of a nut 8. The socket 7a and the head 7 are adapted to receive the ground wire.

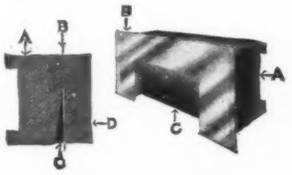
In a modification, the ground wire is to be inserted in the socket 14, in which case no special bolt is necessary as in the other form.

In the Manufacturing Field

The Homer Roberts Lightning Arrester.

The accompanying illustrations show in detail the latest results obtained by the Homer Roberts Telephone Company, of Chicago, in the perfection of its lightning arrester.

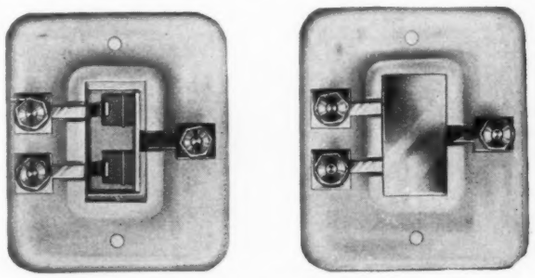
The carbons are of the well known Roberts design with



A—Line Carbon, B—Mica,
C—Spark Gap,
D—Ground Carbon

the familiar spark gap which has proven so effective as a protection against lightning for the past two years.

The mica dielectric is cemented to the line carbon leaving an ample projecting margin all around. Both dielectric



Open and Closed View of the No. 55 Arrester.

and carbon are then carefully and accurately ground away so that when the arrester is in position the spark gap is a triangular shaped chamber closed at the top. This arrangement not only effectually disposes of the carbon dust, making the leaving of grounds on the line absolutely impossible, but protects the protector itself. The continuous arcing of static currents that always precede heavy electric discharges fills the chamber with gas, converting the whole of it into a field of low resistance to ground, so that a bolt heavy enough to obliterate the ground wire leaves the arrester uninjured.

Special attention is called to the neat and attractive appearance of the base of this arrester which is manufactured of the highest grade of porcelain.

The cap which encloses the carbons is readily removable, permitting inspection and at the same time giving ample protection against the deposition of dust and the collection of moisture on the carbons. This renders it feasible to install the arrester on the porch or in some other out-of-the-way place.

The carbons used in this arrester are also exceedingly well adapted for use in distributing racks and can tip terminals on poles, and, as experience has demonstrated, afford very efficient lightning protection.

A Battery Box for Desk Telephones.

The following letter regarding battery boxes for desk telephones has been received:

"In the Practical Questions and Answers of October 10, a correspondent asks, 'Where to put dry cells on a desk set.' In answering the question attention is called to the undesirability of the usual methods of taking care of batteries used with magneto desk sets. The use of a box is recommended, and a sketch given of a rough wooden box that can be used. The article ends in calling attention to the fact that a neat metal box may now be obtained from the dealers. A box of this kind is the Paragon battery box, an illustration of which is shown herewith. This box is a great improvement over the wooden box in appearance and is so well made and so handsomely finished that it can be put on the wall or on the side of the desk without detracting in the least from the appearance of the job. As the answer to a correspondent states, 'The safety of the

cells and the ease with which inspections, tests and renewals can be made will more than repay the slight cost of this box, and it is adopted where other means of support are awkward and impossible.'

"As shown in the illustration, there are two slotted screw

The Paragon Battery Box.

holes in the back of the box, by means of which it can be attached to the wall or desk, the shape of the holes permitting the box to be lifted off whenever the batteries are to be inspected or renewed.

"The Paragon battery box is lined with heavy insulating fibre which protects the batteries from the box, absolutely preventing short circuits. The cover and also the bottom of the box are lined with the same fibre. In the cover there is a hole for leading out the connecting wires, and the edges of the hole are insulated by the fibre lining, preventing short circuiting of the wires at this point. There is also a hole in the bottom of the box, similarly insulated, to be used in case it is desired to lead the wires out below.

"The cover is attached to the box by a nickel plated chain. On this chain the cover hangs when removed for the purpose of examining the batteries or connections. Being made of heavy sheet steel and handsomely finished in black japan, the box is strong and serviceable. It is for sale by all telephone manufacturers and electrical supply dealers, or by the manufacturer, F. W. Pardee, 52 Fifth avenue, Chicago."

The Stolz Electrophone.

The Stolz Electrophone Company has leased the four-story building at 280 East Ohio street, Chicago. This will be used entirely for manufacturing the Electrophone, which is finding great favor with all persons whose hearing is at all defective. The device consists of a small electric telephone that fits the ear and is very inconspicuous. By the use of this device the buzzing and roaring ear noises are overcome and in a number of cases the hearing has been restored.

The London office of the company report that Lady Truscott, wife of the Lord Mayor, is using the Electrophone and is very much pleased with it. Mr. W. M. Hoyt, a well-known wholesale grocer of Chicago, is quite emphatic in his endorsement of the instrument.

The firm is planning an interesting exhibit for the Chicago Electrical Show, which takes place in January. The sales offices of the company still remain at 720 Stewart building, Chicago.

THE MASSACHUSETTS CHEMICAL COMPANY has just announced that it has moved its New York office, Ocotber 1, from 237 Broadway to the Hudson Terminal building, 30 Church street. Mr. A. G. Cozzens is sales agent, as formerly. At the new address the well-known line of electrical tapes, insulating fabrics and compounds and molded rubber goods will be carried to fill emergency orders.

THE CENTRAL ELECTRIC COMPANY, Chicago, has in its 1909 general catalogue, now ready for distribution, a handsome volume of 1024 pages. Considerable space is given to the specialties for which the company acts as sales agents, among which are numerous lines of high grade material for electrical light and power work, as well as for telephone work. Okonite wires and cables are prominently listed in the catalogue.

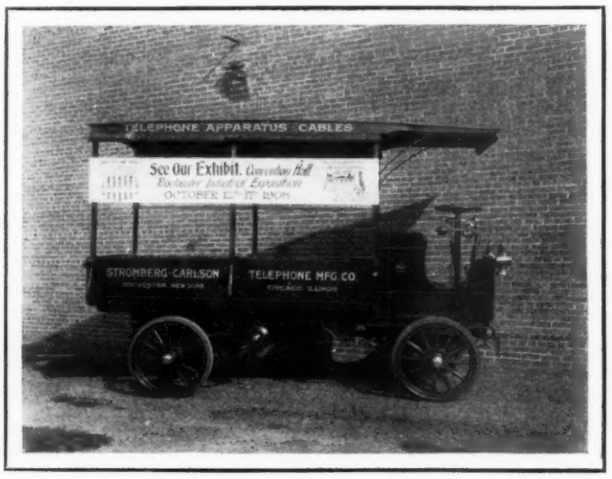
ALLEN L. HASSE has joined the staff of the Harvard Electric Company, 66 W. Van Buren street, Chicago, and 136 Liberty street, New York City. His duties will relate particularly to pushing the company's well known line of construction apparatus, including the Harvard patent steel bracket. Mr. Hasse has had long experience in managing the sales of brackets to wire using companies, and is well known throughout the field.

THE SCHUETT MANUFACTURING COMPANY is now in its new location at 590 West Lake St., Chicago, Ill. The Schuett self-welding wire joint is reported to be meeting with general favor among telephone men and with its new quarters and facilities the company expects to greatly increase the sales of this joint.

THE ELECTRICAL EMPLOYMENT AGENCY conducted by Benj. H. Wade at Deposit, N. Y., is to be incorporated under the name of Wade's Employment Exchange. Mr. Wade announces that many improvements are to be made in the office equipment.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., was one of the leading exhibitors at the recent Industrial Exposition at Rochester. The company sent out letters calling attention to the magnitude of the Independent telephone industry, and mentioning the prominent part which the Stromberg-Carlson Company has played in building up this business. Names of several of the cities having extremely large Stromberg-Carlson multiple switchboards are given, including St. Louis, Mo., Rochester, N. Y.; Syracuse, N. Y.; Utica, N. Y.; Des Moines, Ia.; Kansas City, Mo.; Louisville, Ky.; and Seattle, Wash.

The letter states that the company has up to date fur-



Stromberg-Carlson Automobile Advertising.

nished 1,100,000 telephones, and equipment for 7,000 Independent exchanges. The illuminated map, on which a telephone switchboard lamp represents each city in which there is a Stromberg-Carlson switchboard, attracted a great deal of attention at the exposition.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONAL.

MR. DELBERT DOUGLAS has been appointed manager of the Iowa Telephone exchange at Anamoosa, Iowa.

MR. C. W. QUILLAN has been elected manager of the Mt. Pleasant Telephone Company of Mt. Pleasant, Iowa.

MR. F. EWING has been appointed manager of the Jackson County Telephone Company's exchange at Buckner, Missouri.

MR. JOSEPH DUFFY of DeKalb, Ill., has been appointed manager of the exchange of the Central Union Telephone at Sterling, Ill.

MR. CARL THOMAS of Green Bay, Wis., has been appointed manager of the Wisconsin Telephone Company's exchange at Algoma.

MR. L. M. ELLIS of Los Angeles, Cal., has been appointed manager of the Home Telephone Company of San Bernardino, Cal., succeeding Mr. Ralph Haven.

MR. ANDREW J. MELLEN, of Toledo, Ohio, has been promoted to the managership of the Central Union Telephone Company's exchange in Sandusky, Ohio.

MR. H. S. JOHNSON, formerly of Santa Rosa, California, has been appointed district manager for the Iowa Telephone Company with headquarters at Le Mars, Iowa.

MR. C. B. HALL, formerly with the Detroit Home Telephone Company, has been appointed manager of the Washtenaw Telephone Company of Ann Arbor, Michigan.

MR. C. B. KING has tendered his resignation as manager of the Washtenaw Home Telephone Company of Ann Arbor, Michigan, and will take a vacation for his health.

MR. WM. LAWTON, formerly manager of the Wisconsin Telephone Company's exchange at Genoa Junction, has been appointed manager of the company's exchange at Burlington.

MR. E. E. ENGLAND of Mt. Pleasant, Iowa, has been elected manager of the Ottumwa Telephone and Electric Company, Ottumwa, Iowa, and will assume his new duties November 1.

MR. H. E. DAVIS, formerly with the Home Telephone Company, Joplin, Mo., has been appointed superintendent of operation and equipment for the Topeka Home Telephone Company, Topeka, Kan.

MR. ROY H. JOHNSON has been appointed acting general manager of the Grant County Telephone Company, Silver City, N. M., filling the vacancy caused by the recent death of Mr. Clyde Smith.

MR. SAMUEL C. HARVEY, formerly with Frank B. Cook in Chicago, Ill., has been appointed manager of the San Diego Home Telephone Company, San Diego, California, succeeding Mr. N. Yenrick, resigned.

MR. HOWARD STOFER, formerly manager of the Southern Michigan Telephone Company's exchange at Benson, Mich., has been appointed manager of the exchange of the Star Telephone Company at Sodi, Ohio.

MR. H. H. LLOYD, formerly manager of the Charlestown exchange of the Cumberland Telephone and Telegraph Company, has been promoted to the position of manager of the company's exchange at Richmond, Ky.

MR. RALPH L. HAVEN of San Bernardino, Cal., district manager of the Home Telephone Company for the territory including San Bernardino, Colton, Highlands and Riverside, has resigned on account of ill health.

Mr. L. C. MADDOX, Shelbyville, Ky., has been appointed manager of the Cumberland Telephone & Telegraph Company's exchange at Charleston, Ky., succeeding Mr. H. H. Floyd who has been transferred to Richmond, Ky.

MR. F. J. BIELER of Boston, Mass., formerly connected with the auditing department of Stone and Webster, has been appointed assistant secretary of the Massachusetts Highway Commission. The work will be to a considerable extent in connection with the telephone department of the commission.

MR. M. H. DRIFTMIER, who has for the past two years been in charge of the business of the Independent Mutual Telephone Company of Shenandoah, Ia., as manager, has tendered his resignation. Mr. Driftmier's health has not been good for some time past, and he is going west to live in a more favorable climate.

Under Mr. Driftmier's management the exchange at Shenandoah has grown and become very prosperous and successful.

NEW COMPANIES.

NUNEZ, GA.—The Mutual Telegraph & Telephone Company, of Georgia has been incorporated with a capital stock of $3,000. The headquarters of the company will be at this place.

SIGEL, ILL.—A mutual telephone company has been organized in this place. The officers are: C. V. Chappelear, president; George Ludwig, secretary: R. M. Baker, treasurer. Directors: Alonzo Bigler, chairman; R. C. Zachow, H. E. Storm, B. Niebruge and B. H. Kunkler.

CROFTON, NEB.—The Northwestern Mutual Telephone Company has been incorporated with a capital stock of $5,000. W. W. Crandall is secretary of the company.

WOLBACH, NEB.—The Wolbach Telephone Company has filed articles of incorporation, the capital stock being given as $30,000.

HARRISBURG, PA.—The Lavelle Telephone & Telegraph Company, Schuylkill county, has been incorporated with a capital stock of $5,000. The treasurer is H. O. Lenker, of Lavelle.

READING, PA.—A new rural telephone company has been formed at Birchrunville, Chester county, which is to be connected with the Phoenixville exchange of the Keystone Telephone Company. J. B. Mosteller is president and A. C. Walker, secretary. The company will be known as the Birchrunville Rural Telephone Company.

FINANCIAL.

CORONA, CAL.—The capital stock of the Corona Home Telephone & Telegraph Company has been increased from $25,000 to $50,000.

ALBANY, N. Y.—A quarterly dividend of 1 per cent has been declared by the directors of the Albany Home Telephone Company. It is payable October 20 to stockholders of record on October 10.

TOLEDO, OHIO.—The Toledo Home Telephone Company has declared its regular quarterly dividend of 1½ per cent. on its capital stock of $1,257,000. The dividend is payable October 20.

FRANCHISES.

BIRD ISLAND, MINN.—The village Council has granted a franchise for a telephone system to A. C. Bowe of Merriam Park. He will install a modern plant, using the common battery system.

LEMMON, S. D.—The Montana-Dakota Telephone Company has been granted a franchise to maintain a long distance telephone system and exchange in this town.

CONSTRUCTION.

BREWTON, ALA.—A telephone line from this place to Roberts, 17 miles distant, is under course of construction, the funds for this purpose having been contributed by private individuals. There will be a number of telephones at Roberts, and the line will be connected with the exchange at this place.

WASHINGTON, D. C.—The Caroline County Telephone Company is extending its line to the town of Bagley, and from this point a line will be built to Port Royal, on the Rappahannock river.

BOISE, IDAHO.—A telephone line will be constructed by Slick Brothers along the line of their construction plants on the King Hill project. It will extend from their camp on the Malid down the south side of the Snake river to Glenn's Ferry, where it will connect with Hagerman and Bliss. There is about 16 miles of line completed.

TROY, IDAHO.—The Interstate Independent Telephone Company is constructing a line connecting this place with Dreary. Several farm lines will be connected with this line and connections will also be made with Helmer and Avon.

MOUNDS, ILL.—The Home Telephone Company is making many improvements in its system.

MT. CARROLL, ILL.—The Independent Telephone companies of Savannah and Sabula have made arrangements to put in a new cable between the two cities, the work to be started in a short time. The cost of installing the cable will be about $1,000.

TRILLA, ILL.—The Trilla Mutual Telephone Company has recently completed the installation of its new switchboard.

DECATUR, IND.—The new line of the Decatur Home Telephone Company between this city and Fort Wayne has been completed and is now in service. It was necessary to build this new line on account of the induction on the old lines from the high tension wires of the Fort Wayne and Decatur interurban line. The telephone and power lines are now over a mile apart.

HAMMOND, IND.—The Crown Point Telephone Company is making extensive improvements to its lines at Merrillville, the number of new telephones and the new business there necessitating the changing of the present system.

GLADBROOK, IA.—A new switchboard will be installed by the Traer Mutual Telephone Company and other improvements will be made.

BRAHAM, MINN.—The Tri-State Telephone Company will make many improvements to its system in this place.

CLARA CITY, MINN.—A line will be built by the Tri-State Telephone Company from this place to Wilmar.

IONA, MINN.—The Woodgate Telephone Company is extending its system to the Nobles county line.

MADISON LAKE, MINN.—The Citizens' Telephone Company contemplate building new telephone lines in this vicinity.

RED LAKE FALLS, MINN.—The Northern Minnesota Telephone Company is constructing a line which will connect Terrebonne, Brooks and Lambert with Red Lake Falls. The line is to be 18 miles long.

SEDALIA, MO.—The Sedalia Home Telephone Company, which succeeded the old Queen City Telephone Company, expects to have its new equipment in operation before the first of November. A new switchboard is to be installed and all old instruments replaced with new ones. The company now has contracts for 1,240 telephones, and will commence their installation at once.

BILLINGS, MONT.—The Mutual Telephone Company has completed the installation of a new automatic system. The company has about 2,000 instruments in use.

VICTOR, MONT.—J. A. Curran, proprietor of the Bitter Root rural telephone exchange will install exchanges at Victor and Corvallis.

ALBANY, N. Y.—The East Springfield Telephone Company has completed its lines between Fort Plain and Cooperstown. Connection is had with the Independent Union's lines at Fort Plain.

VALATIE, N. Y.—The Valatie Telephone Company is building a private line from this village to Stuyvesant Falls, the work being under the supervision of Edward Lasher, general manager.

WATERTOWN, N. Y.—The Jefferson County Telephone Company, the successor of the Citizens Telephone Company, has purchased the lot on the west corner of Park place and Stone street and will soon begin building a new structure. The building will be of brick, trimmed with stone, and will be two stories high.

HAMILTON, N. D.—A farmer's line to the Fleming district is to be constructed at once by the Citizens' Telephone Company.

REEDER, N. D.—This place is to be connected with Hettinger by the Dakota-Montana Telephone Company.

McALESTER, OKLA.—The McAlester-Eufaula Telephone Company has a large force of men at work putting up a messenger wire to carry another large cable.

TAHLEQUAH, OKLA.—A number of citizens of this place have almost completed a telephone line from Tahlequah to Gideon and Peggs. The company is known as the Cherokee Telephone Company.

ASHLAND, ORE.—A telephone line will be constructed from Ashland to the summit of Ashland Butte by the Forest Service telephone men, under the direction of foreman Redmond, and acting supervisor Swenning. The line when completed will be about 12 miles in length.

PORTLAND, ORE.—The Home Telephone Company has just opened service over its new copper circuits to the following towns in the State of Washington: Felida, Sara, Ridgefield, Woodland, Kalama, Carrollton, Kelso, Ostrander, Castle Rock and Olequa. This is in addition to Willamette Valley points previously connected.

ERIE, PA.—The Union Telephone Company, which handles the long distance service for the Mutual Telephone Company has just completed the installation of a new four-position toll board.

IRISHTOWN, PA.—The Freeport Telephone Company is building a line on the east side of the river to Braeburn and many farmers are having telephones installed.

JOHNSTOWN, PA.—The Johnstown Telephone Company will shortly commence improvements on its Eighth ward, Westmont and Dale lines which are to cost $50,000. All open wires are to be taken down and replaced with cables. Crossing of wire will also be done away with.

KRUMSVILLE, PA.—The Kutztown Rural Telephone & Telegraph Company expects to establish a new line from Krumsville to Hamburg. It has placed two more wires from Kutztown to Kempton.

SHAMOKIN, PA.—The directors of the Roaring Creek Valley Telephone Company at a recent meeting at Numidia decided to build a trunk line from Numidia to Ringtown, where connection will be made with all sections of Schuylkill county. They also decided to extend their lines down to Bear Gap which will open up a new territory and give telephone accommodations to a large number of farmers who have been without it. A fifty capacity line switchboard will be installed in the Numidia office. It was decided to commence work on these proposed improvements at once.

WASHINGTON, PA.—The National Telephone Company's system in this place is to be completely overhauled. A new switchboard is to be installed and a large part of the cable will be placed underground. The work will be started at once.

NEWBURY, S. C.—Residents in the district between Pomaria and Little Mountain have arranged for the construction of private telephone lines and the construction work has already been commenced.

GALLATIN, TENN.—The Sumner County Home Telegraph Company has recently ordered a number of new telephone sets. All the switchboards of the company have been overhauled and placed in first-class condition. A line is being built from Portland to Mulloys, which will connect Cross Plains, White and Springfield, thereby giving connections with Nashville by a shorter route.

LEESVILLE, TEX.—The business men of this place are building a rural telephone line to Union, Wilson county. A line from this place to Gonzales is also contemplated.

CHENEY, WASH.—At a special meeting of the Cheney Commercial Club recently held, J. W. Minnick, E. Weller and A. L. Ames were appointed to carry out the project of constructing a suburban telephone line to Meadow Lake.

PUYALLUP, WASH.—The construction of the outside plant of the Puyallup Valley Telephone Company is progressing rapidly.

MADISON, WIS.—A telephone line is being constructed through the vicinity of West Oakland and running from Madison to Fort Atkinson.

OSCEOLA, WIS.—The Milltown Telephone Company is installing a new switchboard. A new line to the vicinity of Horse Creek is to be constructed.

SALMO, (P. O. BAYFIELD), WIS.—A telephone line will soon be built in this vicinity.

CLEARMONT, WYO.—The reconstruction of the Buffalo-Clearmont telephone line is progressing nicely.

GARLAND, WYO.—The Garland Telephone Company is extending its line to the Pine Bluff coal mine.

ELECTIONS.

ELLSWORTH, ILL.—At the annual meeting of the Dawson township Mutual Telephone Company, the following directors were elected: H. S. Bane, George Frink and W. D. Wightman.

ALBANY, N. Y.—The directors of the Home Telephone Company have elected P. J. Fitzgerald manager and George H. Rymers, secretary, to fill the unexpired term of H. M. Keyes.

WHEELING, W. VA.—The regular annual meeting of stockholders of the National Telephone Company was recently held and the following directors were elected: John A. Howard, William C. Handlan, S. W. Harper, J. T. Handlan, John L. Dickey, A. S. List and Colonel Thomas O'Brien.

MISCELLANEOUS.

WABASH, IND.—W. O. Taylor has purchased the interests of his partners in telephone exchanges at Lagro, Andrews and Mt. Etna for $20,000. Mr. Taylor has been in personal charge of the system for some time and has built it up to its present state of efficiency.

AMES, IA.—A committee has been appointed by the Farmers General Association to investigate the situation in this city for putting in an exchange.

MINNEAPOLIS, MINN.—It is stated that the university regents are considering establishing an Independent telephone system at the State University. At present there are sixty-eight telephones at the university and some departments have to maintain both Bell and Independent telephones. The entire cost to the university per year is $2,000. The cost of installing and maintaining its own system would be small, as it would be taken care of by the electrical department. All depends upon what rates can be obtained from the Tri-State and Northwestern companies for connection outside the university.

PENDLETON, TEX.—J. W. Moore & Sons have sold to J. J. Spires and S. G. Garth of this community the Pendleton telephone exchange, together with one business lot and frame building, for a consideration of $5,000.

BUTTERNUT, WIS.—The controlling interest in the Glidden telephone line has been purchased by E. H. Banch.

KARLSBORG, WIS.—The interest of Mr. Newcomb in the local telephone company has been purchased by T. B. Johnson.

UNDERGROUND.

WAUKEGAN, ILL.—The last link of the Chicago-Milwaukee underground telephone conduits is being laid between Lake Bluff and Lake Forest. Work on the big job between the two cities has been going on for about two years. It is now expected to open it for public use November 1.

JEFFERSON, IA.—The Greene County Telephone Company has decided to place some of its wires underground. Contracts have been let and work will begin at once.

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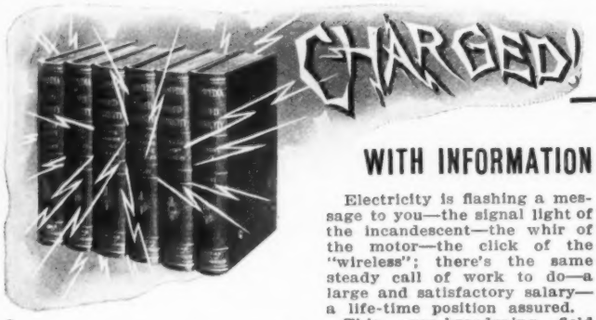

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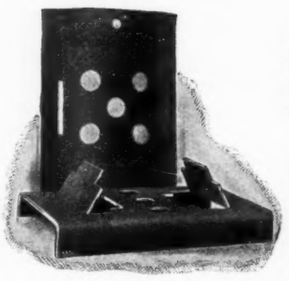

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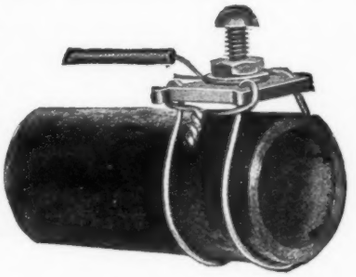

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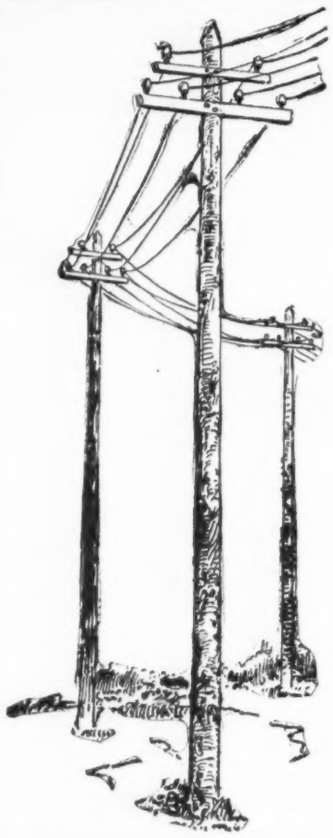

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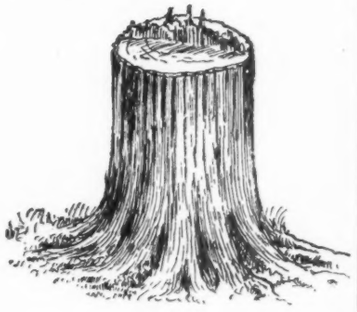

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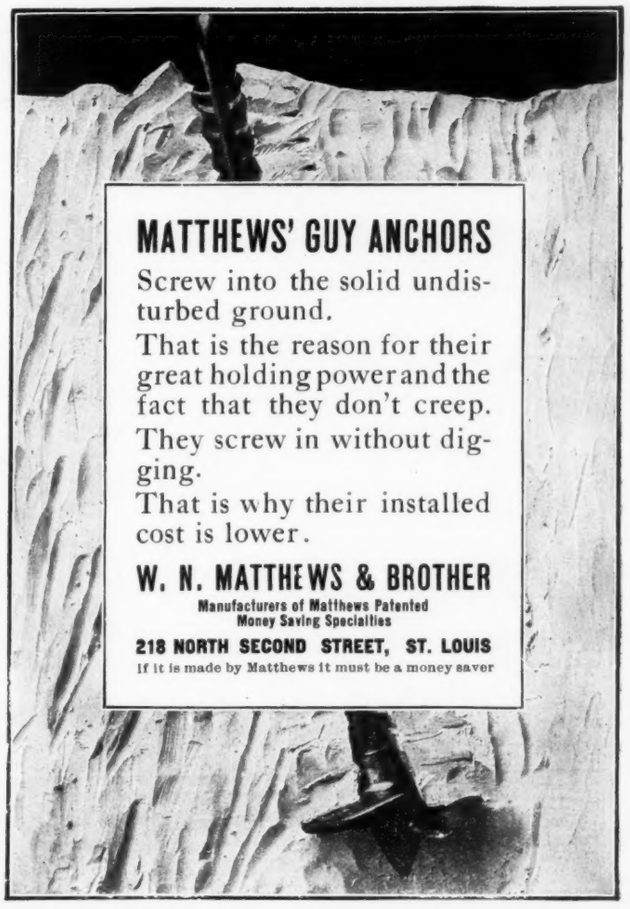

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Screw into the solid undisturbed ground.

That is the reason for their great holding power and the fact that they don't creep.

They screw in without digging.

That is why their installed cost is lower.

W. N. MATTHEWS & BROTHER

Manufacturers of Matthews Patented Money Saving Specialties

218 NORTH SECOND STREET, ST. LOUIS

If it is made by Matthews it must be a money saver

DOTY LUMBER AND SHINGLE CO.

Manufacturers of

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Cross Arms. Red
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In any Length

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WILL OUTLAST ALL OTHER KINDS

GET OUR PANIC PRICES. We can fill all sized orders from our own stock 150,000 ON HAND. Twenty-eight years have we been producers.

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Principal Office: MONROE, MICHIGAN

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WHITE CEDAR POLES

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Buy from the Producers and Save Jobbers' Profits

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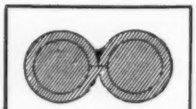
CYPRESS POLES AND PILING From 5"—25' to 8"—70'

Prompt Deliveries - - - Write for Prices

Before Twisting

—the "SCHUETT" SELF-WELDING WIRE JOINT


After Twisting

— insures an absolutely ideal and lasting connection
— air nor moisture cannot penetrate or corrode
—the joint is stronger than the wire itself

Our list is lowest, discounts better.
Write for descriptive matter.

SCHUETT MANUFACTURING COMPANY
590 W. LAKE STREET :: :: CHICAGO, ILL.

100,000 WHITE CEDAR POLES
BACKUS-JUDD LUMBER AND COOPERAGE CO.
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POLES
NORTHERN WHITE CEDAR
Give best service. Our prices are lowest.
May we quote?
ITASCA CEDAR COMPANY, Deer River, Minn.

WHITE CEDAR POLES
Producers and Wholesalers Prompt Shipments
Standard Cedar & Lumber Co.
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POLES White or Red Cedar, any length
Ask for delivered prices
FARIS & MAYHEW LUMBER & POLE CO., Den ver Col.

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Cedar Yards { Ozark, Mich. / Spur 461 Soo Line
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POLES From stump to consumer.
A full assortment of sizes.
KAYE & CARTER, Minneapolis, Minn.

WHITE CEDAR POLES Complete Stock All Sizes
Get my prices before buying GEO. HARDING, Deer River, Minn.

CEDAR POLES
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CLASSIFIED ADVERTISEMENTS

And want advertisements not exceeding twenty words, exclusive of address, will be inserted in these columns for $1.00 each. For over twenty words, the rate will be 5 cents per word.

FOR SALE—Telephone exchange; 75 subscribers in Wisconsin; toll line connections; no opposition. This will pay you $90 per month; can be bought for $1,000 and increased double the size. Address Snap, care TELEPHONY.

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CHEMICAL ENGRAVED NAME PLATES and drop numbers. Steel stamped letters and figures. Send for samples and prices. C. H. Hanson, 44 Clark St., Chicago.

THE HOME TELEPHONE COMPANY, of Wabash, Indiana, having recently changed from the magneto system to the central energy system, has the following property for sale: A good opportunity for some person to get material to start a small exchange cheaply:

1 Stromberg-Carlson Mfg. Co. magneto combined toll and rural board; 2 position toll and 1 position rural. In good working condition and looks as good as new.

6 sections magneto switchboard, same make, in good order; will sell as a whole or by section.

500 Stromberg-Carlson Mfg. Co. telephones. Write for prices. Address W. S. Stitt, Secretary The Home Telephone Co., Wabash, Ind.

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WANTED—By leading telephone manufacturing concern, a man with good education, familiar with telephone apparatus, thoroughly competent to handle general office as required; stage age, experience, education, salary expected. Address No. 526, care TELEPHONY.

WANTED CABLE TROUBLES—If you have any cable troubles that you want located and fixed, drop us a line and we will arrange to send you a cable man or send you the testing apparatus to locate and clear them yourself. Wireless Cable Tester Co., Cedar Rapids, Iowa.

WANTED—By first-class, all-around telephone engineer, a position as wire chief, local manager or manager of a telephone exchange or system of exchanges. Will bring with me a Queen Acme Wheatstone bridge arranged for making all tests known in the telephone work, Murray & Varley loop, capacity, insulation resistance measurements, etc. At present employed; however, can arrange to leave on short notice. Address 519, care TELEPHONY.

All Telephone Books
For sale at lowest publishers' prices—postage prepaid
Telephony Publishing Co.
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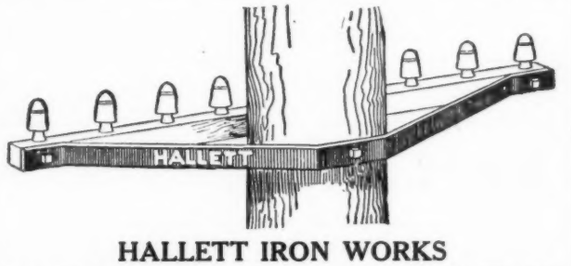
CROSS ARM BACK BRACES
hold the cross arm rigid, which makes Telephone construction work more permanent. We make the braces of flat material or angle iron



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The Cost of Digging

pole and anchor holes goes down to minimum when the

Iwan Post Hole Auger

is used. In every kind of earth, except solid rock, it does the work easier and quicker than any other tool yet devised for the purpose.

Our booklet, "Easy Digging", contains valuable information. Write for a copy.

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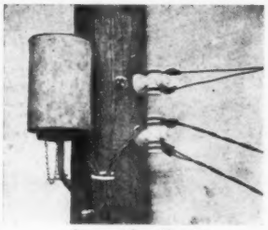
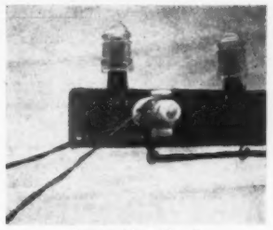


Suggestion No. 13



Suggestion No. 2

Universal Insulators

SOME ADVANTAGES:

A Separate Groove for Each Wire—Grooves for Any Direction—Universal—All Porcelain—Will Not Rot or Rust—Prevents Damage to Twisted Pair Wires—Reduces Maintenance.

Write for Descriptive Literature

Universal Specialty Company
116 S. Seventh St. Terre Haute, Ind.

Suggestion No. 5

Suggestion No. 8

WESTON

Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION VOLTMETERS and AMMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.

Weston Electrical Instrument Company

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Paris, France—E. H. Cadiot, 12 Rue St. Georges.
Berlin—European Weston Electrical Inst. Co., Ritterstrasse No. 88.
New York Office—74 Cortlandt Street.

STANDARD PORTABLE DIRECT READING

VOLTMETERS, AMMETERS, MILLIVOLTMETERS, VOLTAMMETERS, MILAMMETERS, OHMMETERS, PORTABLE GALVANOMETERS, GROUND DETECTORS AND CIRCUIT TESTERS

Weston Standard Portable Direct Reading Voltmeter. Model 1.

Renewing Batteries by Guesswork

Costs money and means poor service. Test them with a

CONNECTICUT POCKET METER

and know their condition. Its use will decrease complaints, improve your service and save money. Fully described in Circular T.

CONN. TELEPHONE & ELECTRIC COMPANY, Inc.
MERIDEN, CONN.

The Leeds & Northrup Co.,

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PHILADELPHIA
Monadnock Block
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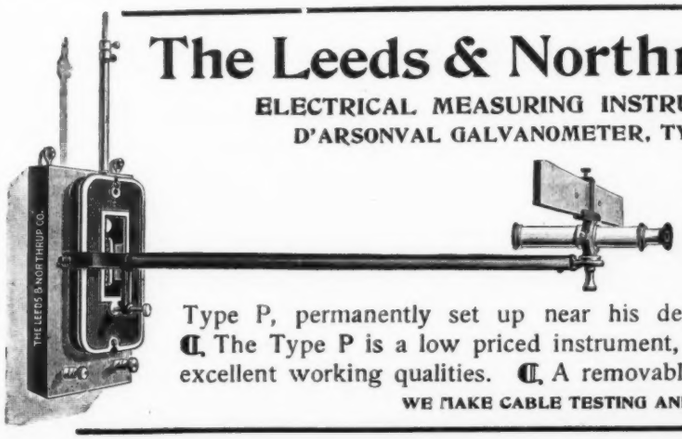
ELECTRICAL MEASURING INSTRUMENTS
D'ARSONVAL GALVANOMETER, TYPE P



¶ Your wire chief has use for a reflecting type D'Arsonval Galvanometer. His cable testing set will have a greater range if he can make insulation and capacity measurements with a reflecting galvanometer. With our Type P, permanently set up near his desk, he can make routine tests of insulation. ¶ The Type P is a low priced instrument, well made, of pleasing appearance, and has excellent working qualities. ¶ A removable damper converts it for ballistic measurements.

WE MAKE CABLE TESTING AND FAULT LOCATING APPARATUS

American Electric Telephone Co., Chicago

WE ISSUE THE FOLLOWING BULLETINS AND CATALOGUES

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" " 11—Desks—Toll and Private Branch.
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" " 18—Magneto Telephones of all Kinds.

INDEPENDENT LOCAL AND LONG DISTANCE TELEPHONE

Bulletin No. 19—Central Energy Switchboards.
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" " —Protective Apparatus and Terminal Equipment.
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WE SEND THEM POSTPAID, WRITE FOR THEM

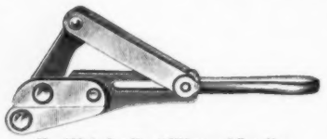
RUBBER COVERED WIRES AND CABLES

For all Classes of HIGH-GRADE ELECTRICAL SERVICE

42 Broadway, New York
N. I. R. Wires and Cables carried in stock by the MONARCH ELECTRIC & WIRE Co., Chicago, Ill.

NATIONAL INDIA RUBBER CO. BRISTOL, R. I.

Klein's New "Chicago Grip"



No. 368-A, for No. 6 Wire and Smaller

is made of steel forging, polished and nickel plated. It is a well-proportioned and reliable tool. The draw link is arranged so it does not fall in the way of the wire. It holds fast on iron or copper wire. Do not fail to have our Catalog on file. It is arranged with Code and List numbers for convenient ordering.

All prominent supply houses carry our products.

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SPECIAL
CONDITIONS
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PROMPT ATTENTION

INSULATED
WIRES and CABLES
RUBBER — CAMBRIC
THE SIMPLEX ELECTRICAL CO-BOSTON

The Mansbridge
"DREADNOUGHT"
Self Sealing
CONDENSER
(PATENTED)

Reduces maintenance costs.
Never short circuits or breaks down.
Stands 500 volts permanently and 1000 volts momentarily.
Proof against lightning discharges and power circuit crosses.

Absolutely the Best Condenser

Costs no more than the old kind and is smaller, lighter and infinitely more reliable in use

Apparatus to be up-to-date must be fitted with the Mansbridge **Dreadnought**

CONDENSER

Patented by G. F. Mansbridge, St. Margarets Sanderstead, Croydon, England.
Manufactured in U. S. A.
Applications for license to manufacture in U. S. A. and Canada should be addressed to the Patentee.

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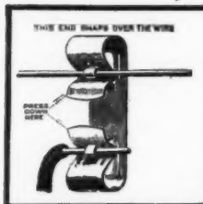
THE SEYMOUR MFG. CO.
SEYMOUR, CONN.

GERMAN SILVER
RESISTANCE SHEET AND WIRE

COPPER WIRE
BRASS, BRONZE AND COPPER



Fahnestock "Snap-Over" Connector

For connecting bridging 'phones to party line wire. One end snaps over the tight line wire. No dead end needed. Connects iron wire, copper wire or iron to copper wire. Positive spring contact.

FAHNESTOCK ELECTRIC CO.
129 Patchen Ave. Brooklyn, N. Y.

Frankel's Electric Testing Clips

Patented Nov. 15, 1904.

Sample Doz. - 12½ Cts. Each
100 Lots - - 11 " "
500 " - - 10 " "
1000 " - - 9 " "

From your supply house or
FRANKEL DISPLAY FIXTURE COMPANY
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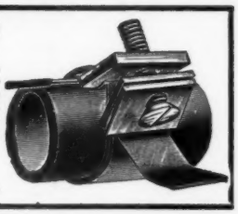
M. & B. Ground Clamp
"THE CLAMP THAT CLAMPS"

For connecting telephone ground wires to lead or iron pipes. The tighter you set the screw the tighter it clamps. SIMPLE IN CONSTRUCTION, EASY TO ADJUST, FITS ANY SIZE PIPE. No lock nut connection to become loose. Wire soldered to strap. Remains tight whether pipe expands or contracts. No loose connections when our clamp is used.

Cheapest and Best Clamp on the Market
Write us for samples and prices
Milwaukee Electrical Specialties Co. - Milwaukee, Wis.



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(Established 1881)
Manufacturers and Dealers in

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Conduits for Underground Wires and Cables, Cross Arms, Poles, Guy Blocks and Lumber

Wood treated by our dead oil of coal tar process will never decay.

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